

# ASHEVILLE - BUNCOMBE TECHNICAL INSTITUTE







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# **ASHEVILLE - BUNCOMBE TECHNICAL INSTITUTE**

**340 Victoria Road  
Asheville, N. C.**

**Catalogue of Courses  
Day and Evening School**

**Volume 3  
1965 - 1966**



# School Calendar

1965 - 1966

## FALL QUARTER

Registration ..... September 7  
Classes Start ..... September 8  
Classes End ..... November 24

Total number of class days: 56

Thanksgiving Holidays—November 25 and 26

## WINTER QUARTER

Registration ..... November 30  
Classes Start ..... December 1  
Classes End ..... February 25, 1966

Total number of class days: 56

Christmas Holidays—December 22 through January 2, 1966

## SPRING QUARTER

Registration ..... March 2  
Classes Start ..... March 3  
Classes End ..... May 24

Total number of class days: 57

Easter Holidays—Good Friday, April 8, Easter  
Monday, April 10

Vocational-Technical Education Conference  
May 30 through June 3

## SUMMER QUARTER

Registration ..... June 6  
Classes Start ..... June 7  
Classes End ..... August 24

Total number of class days: 56

Independent Day holiday ..... Monday, July 4



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# ADMINISTRATION

I. E. Ready ..... Director, Department of Community Colleges  
 Ivan E. Valentine.....Assistant Director of Vocational-Technical Programs  
 Monroe C. Neff.....Assistant Director of General Adult Education Programs  
 Gordon B. Pyle..... Assistant Director of College Parallel Programs

## STATE BOARD OF EDUCATION

William D. Herring, Chairman	Robert W. Scott
Edwin Gill	Charles F. Carroll
J. A. Pritchett	Charles E. Jordan
Charles G. Rose, Jr.	Charles W. McCrary
George Douglas Aitken	R. Barton Hayes
John M. Reynolds	Guy B. Phillips
Harold L. Trigg	

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 John M. Reynolds ..... Reynolds Storage Company  
 W. R. Dillard.....Dillard Construction Company, Sylva, North Carolina  
 Ernest Mills ..... Mills Manufacturing Company  
 Paul W. Markwood ..... American Enka Corporation  
 John H. Giezentanner ..... Attorney, Gennett Building

## ADMINISTRATIVE STAFF

Thomas W. Simpson, B.S.Ed., M.A.Ed., W. C. C.....President  
 Harvey L. Haynes, B.S.Ed., M.A.Ed., W. C. C. .... Dean of Instruction  
 John W. Davis, B.S., M.A.Ed. (1965) Florida State University, ...Director  
 of Student Personnel  
 B. C. Adams, L.L.B., University of Alabama.....Director of Evening  
 Programs  
 J. B. Edwards, Jr., B.S.Ed., Berea College.....Director of Extension  
 James R. Cox, B.S.Ed., East Tennessee State College.....Director of  
 Distributive Education and Tourist Industry  
 James R. Winning, A.B., Clemson College.....Coordinator of General  
 Adult and Community Service Programs  
 Tyrus West, B.S., Western Carolina College.....Area Coordinator, for  
 Firemanship Training  
 Norris H. Bell, A.B., U.N.C. ....Area Coordinator, Supervisory  
 Development Training  
 Mrs. Jane G. Smith .....Secretary to the President  
 Mrs. Jessie P. Goforth .....Secretary  
 Miss Frances Nelson .....Secretary  
 Mrs. Barbara Kitchens .....Secretary  
 Mrs. Helen Bowers .....Cashier  
 Mrs. Nancy Steele .....Secretary  
 Mrs. Kathleen Kyles .....Receptionist  
 E. E. Bryson.....Resident Director, Jackson County Industrial  
 Education Center  
 Miss Peggy Dillard .....Secretary, Jackson County Industrial  
 Education Center  
 John A. Price .....Resident Director, McDowell County Industrial  
 Education Center  
 Mrs. Edna Hall ..... Secretary, McDowell County Industrial  
 Education Center



# FACULTY

- JAMES E. ANDERSON, JR., Dept. Head, Chemical Technology. B.S., Wake Forest, B. CH. E., N. C. State
- BRUCE ARWOOD, Librarian, B.S.Ed., Appalachian State Teachers College
- AIBERT W. AWALD,  
Dept. Head, Tool & Die. G. E. Tool & Die Apprenticeship, Erie, Pa.
- W. CARROLL BRIDGES,  
Dept. Head, Drafting & Design. Western Carolina College, N. C. State
- CLETUS H. CANTRELL,  
Instructor, Radio & T.V., Temple University, Western Carolina College
- MURRAY CHIDESTER,  
Instructor, Physics, B.S. M.E., Northwestern University
- B. STEVENS CREASMAN,  
Dept. Head Electronics, C.R.E.I., Western Carolina College, N. C. State
- RUTH G. DIGGES, R.N.  
Instructor, Practical Nurse, Jackson Memorial Hospital School of Nursing
- FRANCHON F. FUNK,  
Instructor, Related, B.S.Ed., M.A.Ed., Appalachian State Teachers College
- THOMAS E. GAFFIGAN,  
Instructor, Math. B.S. Mathematics, Western Carolina College
- RUTH W. GEDDINGS, R.N.  
Instructor, Practical Nurse, Jewish Hospital Training School.
- N. EUGENE GOODE, Dept. Head, Data Processing Technology. A.B. University of North Carolina
- HAROLD P. HAMRICK,  
Instructor, Electronics. A.B., Wofford, B.S.E.E., North Carolina State
- BURNICE E. HAYNES, Dept. Head, Machine Shop. Morehead City Technical Institute, N. C. State
- ROBERT H. ISRAEL,  
Dept. Head, Heavy Equipment Maintenance, N. C. State, General Motors Diesel Technical School
- ARLENE G. JORDAN, R.N.  
Instructor, Practical Nurse, Abginton Memorial Hospital
- ROY A. LAMBERT,  
Instructor, Math. & Related. B.S., B.S.Ed., Western Carolina College
- JOHN D. LANE,  
Instructor, Technical & Related, B.S.M.E., N. C. State
- G. PAUL LENTJES, P.E.  
Instructor, Electricity & Related, B.S.E.E., University of Pittsburgh
- SARAH M. MORRIS,  
Instructor, Accounting & Related, B.S.Ed., Western Carolina College
- W. C. MAULDIN, Col. USAF (Ret.)  
Dept. Head, Business Administration, B.S., Military Academy, M.A., U.C.L.A., M.B.A., Harvard
- CHARLES F. NOBLITT, Dept. Head, Automotive, N. C. State
- ROBERT L. PARKER,  
Dept. Head, Air-Conditioning-Refrigeration, Chicago Technical College
- STANS C. SLUDER,  
Dept. Head, Welding. Hobart Welding School, N. C. State
- ROBERT SWANN, Instructor—Machine Shop, N. C. State.
- CAROLE H. TOWERY, R.N.  
Instructor, Practical Nurse, Rutherford Hospital School of Nursing
- OLIN R. WOOD,  
Instructor, Mathematics, B.S.Ed., M.A.Ed., Western Carolina College
- JOHN W. WOODY,  
Dept. Head, Carpentry, Cabinet Making, Mars Hill College.



## FOREWORD

Recent advancements in atomic energy, automation, guided missiles, and the advancing era of the push button are the results of the engineer working hand-in-hand with the technician and the skilled tradesman.

It is believed by many that our civilization, as well as our national defense, is dependent upon technology. The need for men and women with trade and technical skill grows more acute as time passes. To provide the type of education so necessary for future scientific advances, industrial progress, and national defense, The Asheville-Buncombe Technical Institute offers a variety of programs, both day and evening, designed to meet the needs of youth and adults of Western North Carolina.

Thomas W. Simpson  
President



# HISTORY, LOCATION, AND PURPOSE

In 1957 the North Carolina State Legislature made possible a program of increased technical training through the formation of Industrial Education Centers. It was felt if North Carolina was to achieve its rightful position in the expanding industrial and technological era, well equipped training centers would be needed to prepare the youth of today to meet the demands of present industry and industries that will locate in our state in the future.

After thorough surveys, both state and local, and a complete analysis of the present needs and future trends of technical and industrial training, Asheville was selected as one of the twenty locations for Industrial Education Centers.

In 1959 the people of the City of Asheville and County of Buncombe approved in a bond election \$300,000 to be used in the construction of two buildings.

The spring of 1963 brought on the first major expansion of facilities. A third building was approved and a \$200,000 loan from the State Literary Fund to the County was made possible. An individual board of trustees was appointed to meet the requirements of the new law passed in the summer of 1963. The new law removed the Center from the State Department of Public Instruction and placed it under the direction of the newly created Department of Community Colleges. The board of trustees requested that the Asheville center be made into a technical institute. This request was approved by the State Board of Education in January, 1964, and the name of the center was changed to Asheville-Buncombe Technical Institute.

## LOCATION

The Asheville-Buncombe Technical Institute is located in three modern buildings on a twenty-one acre tract of land off Victoria Road. The entire 50,000 square feet of floor space is specifically designed to house a Trade and Technical program. Included in the buildings are well-lighted classrooms, large laboratories and shops equipped with the most recent test and production type equipment.

## PURPOSE

The purpose of the Institute is to provide Trade and Technical training for qualified students, both youth and adult. The program is designed to impart profitable skills to the untrained or increase the knowledge of those already trained. The Institute will serve the principal objective to prepare students through practical training to meet the demands of a modern industrial society.



# AREAS OF STUDY

## TECHNICAL DIVISION

Courses offered in the technical division are designed to meet an increasing demand for high level industrial skills in North Carolina. Students entering the Technical division are required to meet educational and aptitude standards appropriate to the course chosen. Such standards require a firm educational base and a level of maturity expected of adults.

Students who successfully complete courses in this division will be prepared to offer prospective employers the training, knowledge, and skill necessary to work as an Industrial Technician. More time will be required to attain such a degree of proficiency than would be necessary in the less exacting trade courses. Applicants for the technical division will therefore be urged to enroll for the full-time program.

## TRADE DIVISION

Courses in the trade division place emphasis on training in those manipulative and mental skills applicable to the particular curriculum in which the student is enrolled. Students work under close supervision to obtain skills on a level acceptable to industry.

## EVENING PROGRAMS

In addition to the full-time programs offered during the day, most of the same curricula are offered on a part-time basis in the evening. These classes meet Monday through Thursday for a total of fifteen hours a week.

Students who enroll in these programs generally work at full time jobs during the day.

Upon successful completion of these evening courses, the A.A.S. degree is conferred in the technical areas while a diploma is awarded in the trade areas.

## EXTENSION DIVISION

The extension division provides avenues of learning to students attending classes at locations other than the Institute. Included in this division are extension units at Sylva, Marion, and Murphy offering pre-employment training in various trade areas. Available at the Sylva unit are automotive mechanics, the masonry trades, carpentry, secretarial training, and drafting. The Marion unit provides automotive mechanics, drafting, and secretarial training. As of this printing the Murphy unit is in the formative stage, with plans for specific curriculum areas incomplete.

In addition to the offerings in the extension units numerous short term courses are provided for men and women who,



though employed, seek to upgrade, update, and generally enhance their individual knowledge and performance. Also available are supervisory-level courses designed to stimulate those individuals who aspire to advance their knowledge in the fields of management, and firemanship training for volunteer-firemen concerned with improving their skill.

Training for new and expanding industry constitutes an important segment of the extension division. In cooperation with the industry involved workers may be trained for specific occupational areas.

## TOURIST INDUSTRY TRAINING

The latest studies available regarding the Tourist Industry show that total receipts from this industry in North Carolina in 1963 amounted to 968 million dollars, provided jobs for 83,300 persons, and contributed 173 million dollars in tax monies to the state.

It is predicted in 1974, this business will reach the two billion dollar mark and by 1984 will be in excess of three billion dollars.

In order to properly train the Tourist Industry to handle their duties more effeciently, the Asheville-Buncombe Technical Institute through the Extension Division offers the following courses:

Motel-Hotel Management Courses, Waitress Training, House-keeping, Cooking Schools, and Tourist Information classes.

All Motel-Hotel Management courses are conducted in conjunction with the American Motel-Hotel Association.

Normally these courses run from 10-20 hours in length. Special courses such as cooking will run longer.

All of these courses are available in the area served by this Institute.

## GENERAL ADULT EDUCATION

To meet the challenge of the space age, the curriculum of adult education will provide studies in subjects as current as the morning headlines and as old as organized knowledge. Any adult, 21 years of age or older, is eligible to enroll in this area. Today's program stresses training or retraining for jobs or upgrading in business or industry, homemaking and parent education, areas of instruction of special community interest, and a high school diploma program for those adults who wish to attain a high school equivalency diploma.

## ADMISSION PROCEDURE AND REQUIREMENTS

### GENERAL REQUIREMENTS

Any North Carolina citizen may be enrolled in a course if he meets the admission requirements. Such requirements will



necessarily depend upon the course of study chosen. The applicant must be sixteen years of age or older and must possess certain basic aptitudes and interests. No applicant may enroll in more than one curriculum.

The applicant should be in reasonably good health with no impairment of vision or physical defect that would restrict his ability in a particular field of work. The applicant may under certain conditions be required to furnish evidence of satisfactory health.

The Institute is co-educational, and its program is not restricted to high school graduates. Technician level students must, however, possess the qualities and maturity of high school graduates. Technician level students must have completed two years of high school mathematics, including one year of algebra. Physics and chemistry are also desirable prerequisites for students entering the school of technology, although these courses are not required.

Educational background, experience, interest and aptitudes will all be considered when an application is made to the Institute.

## ADMISSION PROCEDURE

Persons wishing to take courses at the Institute must complete the entire application process. This consists of the following four steps:

1. Submit a complete application form;
2. Obtain a transcript of credits from the last school attended;
3. Complete the General Aptitude Test Battery administered by the Employment Security Commission;
4. Have a personal interview with the Director of Student Personnel or other member of the administrative staff.

Application forms and testing arrangements may be accomplished by visiting, writing or calling the Institute on Victoria Road. The telephone number is ALpine 4-8185. Transcripts should be mailed from your school directly to the Institute on the standard transcript form in use by your school.

Upon completion of the above procedure, each applicant will receive written notification of the action taken by the admissions committee.

## ADMISSION WITH ADVANCE STANDING

The Asheville-Buncombe Technical Institute will accept work and give credit for work completed in other Industrial Education Centers, Technical Institutes, or Colleges. Applicants for admission with advanced standing should make application as a regular applicant and submit a transcript of work from prior schools. Acceptance of such work will be at the discretion of the President.



# DEGREES, DIPLOMAS AND CERTIFICATES

## DEGREE PROGRAM DEFINED

The Asheville-Buncombe Technical Institute will confer an Associate in Applied Science degree in all Technical Curricula. A state comprehensive examination will be required before graduation in any Technical curriculum. The degree is awarded in the name of the North Carolina State Board of Education.

## DIPLOMA COURSES DEFINED

The Asheville-Buncombe Technical Institute will grant diplomas in the name of the North Carolina State Board of Education on successful completion of any trade level curricula. A state comprehensive examination will be required before graduation in any trade level curriculums.

## CERTIFICATES

Certificates will be issued in the name of the Asheville-Buncombe Technical Institute to students who successfully complete any short term program or course.

## Fees

Registration Fee (required of all students entering or re-entering) -----\$ 2.00

Tuition:

Full-time students (those enrolled for 12 credit hours or more), per month -----\$10.00

Part-time students (less than 12 credit hours), per credit hour -----\$ 2.00

In addition to the fees above, students must purchase prescribed textbooks for each course. Students will be advised in advance of the approximate total cost involved.

## Student Insurance

Certain risks are inherent in any work involving regular contact with mechanical and electrical equipment. While stringent precautions will be taken to insure safety, it is felt to be in the interest of all students to provide some measure of insurance protection.

A group policy providing the desired insurance protection will be maintained in effect by the Institute and all students will be **REQUIRED** to subscribe to such coverage. The cost of accident insurance to the student will be approximately \$2.50 per year.



## Withdrawals & Academic Probation

Any student who must withdraw because of illness or personal hardship may, if his work is deemed satisfactory at the time of withdrawal, re-enter the course as a beginning student provided that such action is taken upon the immediate next offering of the course.

A student may be dismissed from school for failing to achieve passing marks in half the course work undertaken.

A failing grade for one report period will automatically result in academic probation for the following report period. Failure in two successive reporting periods may result in dismissal. Such cases will be considered individually.

## Refunds

No refunds will be made to students who withdraw without authority or who are dismissed for cause.

Students who are given permission to withdraw will receive a refund of their Instructional supply fee on a prorated basis.

## Attendance Requirements

The nature of the program at the Asheville Technical Institute is such it is necessary that students be in attendance regularly and without interruptions due to absences. A cut system is in effect as follows:

1. A student will be permitted to accumulate 3 class absences in a quarter without affecting his grade average. He will be responsible, however, for making up any class assignments during absences.
2. A student who accumulates more than 3 class absences in any one quarter will be dropped from class and will have to be reinstated through the Director of Student Personnel in order to continue.
3. Students who accumulate more than 3 class absences in any one quarter for the following reasons may have their case appraised by the Director of Student Personnel in order to be reinstated in class.
  - (1) Illness or injury to student.
  - (2) Illness or death in the immediate family.
  - (3) Inclement weather (snowstorms, hurricanes, ice)
  - (4) Emergency.
4. A student who has been absent excessively will be subject to failure or dismissal from school without credit. Students will be informed of their absentee status in each grading period.



## Student Conduct

Students will be expected to conduct themselves at all times as individuals of prudence and maturity. The rights and feelings of others will be respected. Each student shall demonstrate a high regard for school facilities and property and for the personal property of others.

School regulations which serve to control such activities as vehicle traffic and parking, smoking, loitering, and other aspects of personal conduct must be stringently observed.

Students may be promptly dismissed for conduct which is considered incompatible with standards of propriety and good judgment.

## Grading System

Grades will be issued to all students who are failing at mid-term and final grades will be issued at the end of the term to all students. Students will be graded on the acquirement of technical skills, ability to work under supervision, interest in work, initiative, and the ability to apply related information.

Students enrolled in either the school of Technology or the school of Trades will be graded by the following system.

<b>A</b>	<b>93 - 100</b>	<b>Excellent</b>
<b>B</b>	<b>86 - 92</b>	<b>Above Average</b>
<b>C</b>	<b>78 - 85</b>	<b>Average</b>
<b>D</b>	<b>70 - 77</b>	<b>Passing</b>
<b>F</b>	<b>Below 70</b>	<b>Unsatisfactory</b>
<b>WP</b>	<b>Withdrawal passing</b>	
<b>WF</b>	<b>Withdrawal failing</b>	
<b>I</b>	<b>Incomplete</b>	

Incomplete: Assigned when a student is unable to complete his work or take a final examination because of illness or for other reasons over which the student has no control. This grade is given only with the approval of the Director of Student Personnel. An "incomplete" must be removed within the first six weeks of the next term in which the student is enrolled. Otherwise, the grade becomes an "F."



## Quality Points

At the end of each quarter quality points are assigned in accordance with the following formula. (The minimum grade-point ratio for graduation is 2.00 or an average grade of C.)

A—4 quality points per credit hour

B—3 quality points per credit hour

C—2 quality points per credit hour

D—1 quality point per credit hour

Grades of F, WP, WF, and I carry no quality points.

Quality ratings are determined by dividing the total number of quality points by the number of hours attempted. If a course is repeated, the last grade will be used in determining a student's hour-quality point ratio. A ratio of 2.00 indicates that the student has an average of C; above 2.00 indicates that he has an average above C; below 2.00 indicates that he has an average below C.

## Additional Counseling and Testing

As mentioned under admission procedure, all applicants will be required to be subjected to a series of aptitude tests. This will be accomplished prior to acceptance and registration. The counselor will schedule interviews with students concerning interpretation of their test scores and he will advise students concerning course selections. Additional aptitude tests may be desirable to determine individual ability. Applicants are not encouraged to enroll unless it is believed that the student has made a sound choice and that he will profit from his choice.

Students are encouraged to use the counseling services at any time. The counseling service will work at all times with individuals to keep them informed of the progress they are making. Also, many reference materials are made available to students during the training program through the counseling service.

## Placement Service

The Institute provides placement service by working with the Employment Security Commission which will assist the students and alumni in securing employment. The objective of this service is to guide and assist the student and graduate in obtaining the type of position for which he is best qualified.

The Institute provides placement service by working closely with local industries and the employment agencies. Personal data sheets will be developed for those graduating students who desire this service. Data sheets will be mailed to selected businesses and industries and group and/or individual interviews arranged.



## **Library**

A technical library is maintained by the Asheville-Buncombe Technical Institute for use by faculty and students. The library contains scientific and technological volumes as well as subject matter materials in all related fields and several current periodicals. New volumes are being added every quarter in order to keep abreast with technological advancements.

## **Student Lounge**

A refreshment and lounge area equipped with a variety of modern vending machines is provided for the convenience of students and faculty. Foods and drinks may not be carried into a classroom, shop, or laboratory.

## **Loan Funds**

The Institute has several loan plans available for students who need financial assistance. Amounts up to one-thousand dollars per year may be arranged by North Carolina residents who meet the qualifications of the various plans. Persons interested in obtaining funds should visit the institute for more specific information.

## **Kearfott Scholarship**

The Kearfott Company of Swannanoa has established a scholarship fund which is available to students of Owen High School who attend the Institute. Recipients of this scholarship are selected by the Student Aid Committee in cooperation with officials from Owen High School. Applications may be submitted after February 1 of each year with selection made in April. The scholarships cover registration and tuition.



# School of Engineering Technology

The following areas of study are included in the school of engineering technology.

Civil Engineering Technology

Electronics Technology

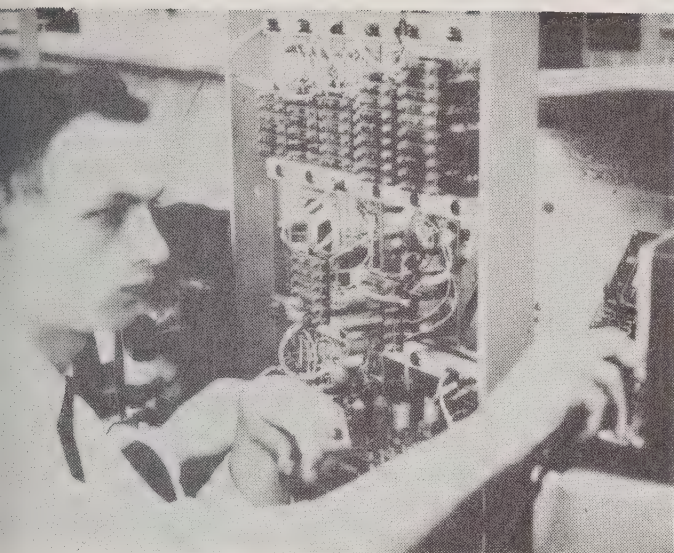
Mechanical Engineering Technology

All of the Curriculums in the school of engineering technology are six quarters in duration and will require about twenty-five to thirty hours per week in classroom and laboratory work. If a student elects to enroll in the school of engineering technology through extension because of his work load, the time required for completion will double. The extension division will offer fifteen hours per week in a particular area of study.

In addition to the regular classroom work each student will be required to spend additional time on outside assignments. The school of engineering technology will also require each student to demonstrate an ability to do research as it relates to original thinking.

Certain courses are required of every student irrespective of the curriculum area. These courses are core courses and will serve as related areas of study in addition to the subjects required by the technical speciality.





## ELECTRONICS TECHNOLOGY

The electronic technology curriculum provides a broad theoretical and practical program of training for those who seek careers in the giant electronic industries. Special equipment is used by the instructor to present circuits of complicated electronics theory in step by step demonstration. In the laboratory the students develop skills in the use of modern electronic testing equipment and measuring instruments. Analysis of circuits, construction of electronic components, and theory of circuit design will be a major part of the laboratory work.

The related subjects will include applied physics, industrial economics, mathematics, technical reports, materials and processes, industrial organization, and technical drawing.

### A.A.S. Degree Conferred

## OCCUPATIONAL OPPORTUNITIES

Electronic Distributor Representative, Civil Service Electronics Inspector, Missile and Rocket Control Technician, Lab worker, Medical Electronics, and Radar Technician.

<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Credit</i>	<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Credit</i>
<i>First Quarter</i>				ELN 312 Electronics I	5	8	9
MA 301 Technical							
Mathematics	5	0	5		15	8	19
PHY 301 Physics:				<i>Fourth Quarter</i>			
Properties of Matter	3	2	4	MA 304 Technical			
ENG 301 Communicative				Mathematics	3	0	3
Skills: Reading				PHY 304 Physics: Light			
Improvement	2	0	2	and Sound	3	2	4
DD 307 General				ENG 304 Communicative			
Drafting	2	3*	3	Skills: Speech	2	0	2
ELEC 310 Direct Current				ELN 313 Electronics II	8	8	12
Electricity	5	6	8				
	17	11	22		16	10	21
<i>Second Quarter</i>				<i>Fifth Quarter</i>			
MA 302 Technical				ISc 301 Industrial			
Mathematics	5	0	5	Organization and			
PHY 302 Physics: Work,				Management	3	0	3
Energy, Power	3	2	4	ELN 316 Transistor			
ENG 302 Communicative				Applications	5	4	7
Skills: English	3	0	3	ELN 317 Communications			
ELEC 311 Alternating				Ultra High Frequency	2	4	4
Current Electricity	5	6	8	ELN 318 Special			
	16	8	20	Circuitry	5	4	7
<i>Third Quarter</i>					15	12	21
MA 303 Technical				<i>Sixth Quarter</i>			
Mathematics	5	0	5	SOC 302 Economics	3	0	3
ENG 303 Communicative				ELN 319 Instrumentation	5	6	8
Skills: Technical				ELN 320 Circuit Analysis			
Writing	3	0	3	and Maintenance	5	6	8
SOC 301 Human					13	12	19
Relations	2	0	2				

\* "Manipulative laboratory" involves development of skills and job proficiency. Credit of one quarter hour for each three hours of laboratory.



# ELECTRONICS TECHNOLOGY

## Course Descriptions

### ELEC 310 ELECTRONICS

An introductory course in basic electricity. Subjects include: Structure of matter, electrical terminology and symbols, electron theory of current flow, magnets and magnetic fields. Rigorous mathematical analysis of D. C. resistive circuits is provided through application of Ohm's Law, Kirchhoff's Laws, Thevenin's Theorem, Norton's Theorem, The Superposition Principle, and Loop Current Method, in the solution of complex resistive networks. Fundamental principles of Inductors, Capacitors, and Time Constants Circuits are introduced.

### ELEC 311 ELECTRONICS

Alternating current and voltage: This course is an introduction to, and a study of, A. C. theory. Mathematical analysis is made of both sine and non-sine wave forms. Inductive reactance, capacitive reactance, and impedance characteristics of A. C. circuits are investigated. The use of vector and complex numbers in circuit impedance is studied. Series and parallel resonant circuit conditions are compared and practical application of these conditions explained. Prerequisite ELEC 310.

### ELN 312 ELECTRONICS

A treatment of electron tubes, semi-conductors and their associated circuitry: Thermionic emission, the diode, triode, tetrode, and pentode characteristics are examined. Theory of semi-conductor diode and transistor operation is studied in detail. Application of both vacuum tubes and semi-conductors in power supplies, voltage amplifiers, power amplifiers, and the advantages and disadvantages of each considered.

### ELN 313 ELECTRONICS

A course in design and analysis of circuitry introduced in electronics ELN 312 with the addition of oscillator circuits, RF and IF amplifiers. Frequency response, stage gain, distortion, and noise characteristics of amplifiers are determined. Oscillator design, frequency stability, tank circuit design, frequency multipliers, and transistor oscillators are explored. Prerequisites ELN 312.



## ELN 316 TRANSISTOR APPLICATIONS

This course provides additional appreciation of transistor circuitry and the design problems unique to transistors: Included are junction diodes, transistor triodes, tunnel and zener diodes with associated circuitry. The effect of temperature variation, transit time, frequency response is studied in detail.

## ELN 317 COMMUNICATIONS AND ULTRA HIGH FREQUENCY

A course in application of previously studied circuits to the broad field of communications and UHF. AM and FM transmitters, AM and FM receivers, wave guides, cavity resonators, klystron, magnetron, and traveling wave tubes are discussed.

## ELN 318 SPECIAL CIRCUITRY

The design and analysis of special circuitry: Included are wave shaping, pulse techniques, broad band amplifiers, diode switches, multivibrators, gates, magnetic amplifiers, chopper amplifiers, clipper and clamping circuits, synchro and servo systems, photo control devices, step counters, and other specific application circuitry.

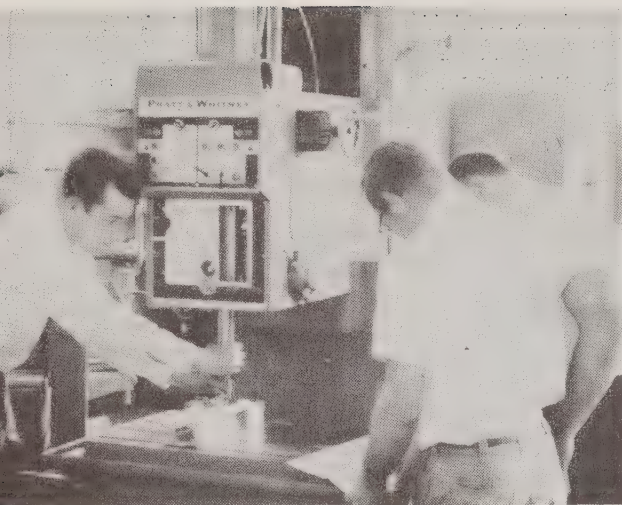
## ELN 319 INSTRUMENTATION

A basic study of sensory devices for detecting changes in pressure temperatures, sound, light and electricity; the associated circuitry and indicating devices.

## ELN 320 CIRCUIT ANALYSIS AND MAINTENANCE

Systematic analysis of complex circuitry. Methods of locating and correcting malfunctions. Troubleshooting by voltage measurements; resistance measurements, and waveform observations. Schematic reading and interpretation.





**A.A.S. Degree Conferred**

## MECHANICAL ENGINEERING TECHNOLOGY

The mechanical technology student will learn the principles of machine design and their applications. He studies torsion, bending, and flexure, of metals; industrial machinery, clutches, brakes, springs, and flywheels. He designs linkage, gear trains, and cams to give required motion to machine. The student will make accurate and complete engineering drawings of the parts that have been designed so that these parts can be produced in the shop. A complete study of materials and processes will be conducted by each student.

## OCCUPATIONAL OPPORTUNITIES

Sales Engineers, Research Assistants, Layout and Detail Draftsman, Foreman, Machine Designers, Assistant Plant Engineers, Field Service Engineers, Plant Safety Technician, and Mechanical Test Technician.

<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Credit</i>	<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Credit</i>
<i>First Quarter</i>				<i>Third Quarter</i>			
DD 307 General				MA 303 Technical			
Drafting .....	2	3	3	Mathematics .....	5	0	5
MA 301 Technical				PHY 303 Physics:			
Mathematics .....	5	0	5	Electricity .....	3	2	4
ENG 302 Communica-				ENG 303 Communica-			
tive Skills: English ..	3	0	3	tive Skills: Technical			
PHY 301 Physics:				Writing .....	3	0	3
Properties of Matter	3	2	4	MECH 308 Machine			
MECH 306 Machine				Processes .....	2	4	4
Processes .....	2	4	4	CHEM 301 General			
ENG 301 Communica-				Chemistry .....	3	2	4
tive Skills: Reading							
Improvement .....	2	0	2				
Totals .....	17	9	21	Totals .....	16	8	20
<i>Second Quarter</i>				<i>Fourth Quarter</i>			
DD 308 General				MECH 309 Machine			
Drafting .....	2	3	3	Processes .....	2	4	4
MA 302 Technical				MECH 310 Physical			
Mathematics .....	5	0	5	Metallurgy .....	3	2	4
ENG 304 Communica-				ELEC 301 Electrical			
tive Skills: Speech ..	2	0	2	Machinery .....	3	0	3
PHY 302 Physics:				MECH 312 Practical			
Work, Energy, Power	3	2	4	Automation .....	3	2	4
MECH 307 Machine				PHY 306 Applied			
Processes .....	2	4	4	Mechanics .....	5	0	5
SOC 301 Human							
Relations .....	2	0	2				
Totals .....	16	9	20	Totals .....	16	8	20



<i>Fifth Quarter</i>				<i>Sixth Quarter</i>			
MECH 311 Physical Metallurgy .....	3	2	4	ISc 301 Industrial Organization and Management .....	3	0	3
PHY 305 Hydraulics and Pneumatics .....	2	4	4	DD 312 Jig and Fixture Design .....	2	4	4
DD 311 Mechanisms ....	3	2	4	DD 309 Plant Layout ..	3	2	4
MECH 305 Strength of Materials .....	3	2	4	MECH 313 Production Planning .....	3	0	3
ISc 302 Quality Control	3	2	4	ISc 303 Motion Study ....	3	2	5
				SOC 302 Economics ....	3	0	3
Totals .....	14	12	20	Totals .....	17	8	21
<i>Electives</i>							
MECH 314 Tool Eng.....	3	0	3				
ISc 304 Value Analysis .....	2	2	3				
PHY 307 Control Systems .....	2	4	4				

## MECHANICAL ENGINEERING TECHNOLOGY

### Course Descriptions

#### MECH 306 MACHINE PROCESSES

An introductory course designed to acquaint the student with basic hand tools, safety procedures, and machine processes of our modern industry. It will include a study of measuring instruments, characteristics of metals, and cutting tools. The student will become familiar with the lathe family of machine tools by performing selected operations such as turning, facing, threading, drilling, boring, and reaming.

#### MECH 307 MACHINE PROCESSES

A continuation of experience begun in MECH 306 with advanced operations on the lathe, drilling, boring, and reaming machines. The student will become acquainted with the milling machine in theory and practice.

#### MECH 308 MACHINE PROCESSES

A continuation in the familiarization of the modern machine tools of industry. Through theory practice and demonstration, the student concerns himself with the shaper, slotter, planer, turrett lathe, screw machine, grinding and finishing machines. Gear design and the processes of manufacturing will be analyzed throughout the course.

#### MECH 309 MACHINE PROCESSES

A study dealing with the newer concepts of work handling and automatic machining processes. A large portion of the theory units will cover topics such as methods of chipless production and new techniques in metal forming. An analysis of high energy forming, ultrasonic machining, electrolytic metal removal, chemical milling, numerical controls, and simplified building block numerical control systems.



## MECH 311 PHYSICAL METALLURGY

A continuation of Physical Metallurgy I expanding on the properties of metals and alloys, the reaction of metals, diffusion, carburizing, metal bonding, and homogenization. Other topics covered will be recrystallization and grain growth, age hardening, nitriding, internal-oxidation and heat treatment of steel. Laboratory experiments and demonstrations will be utilized throughout the course.

## DD 311 MECHANISMS

This course consists of mathematical and drafting room solutions of problems involving the principal machine elements. Included is a study of motions of linkages, velocities and acceleration of points within a link mechanism, and layout methods for designing cams, belting, pulleys, gears and gear trains.

## DD 312 JIG AND FIXTURE DESIGN

Designed to give the student a thorough knowledge of the principles, practices, tools, and commercial standards of Jig and Fixture Design. Through lectures, visual aids, and individual project and design work, the student becomes well acquainted with the many types of jigs and fixtures and their design.

## MECH 313 PRODUCTION PLANNING

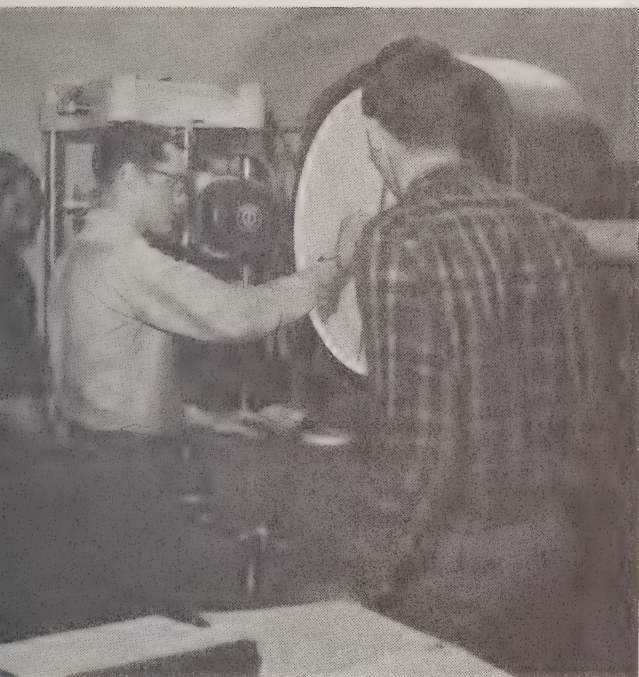
A study of day-to-day plant direction is subdivided for analysis into forecasting, product planning and control, scheduling, dispatching, routing, and inventory control. Case histories are discussed in the classroom for clinical analysis and courses of corrective action are developed.

## ISC 304 VALUE ANALYSIS

The modern concept in the control of manufacturing production. This course will provide the student an opportunity to study a production system with the specific purpose of identifying unnecessary costs.

## PHY 307 CONTROL SYSTEMS

Hydraulic, pneumatic, mechanical, electrical and electronic control systems and components. Basic descriptions, analysis and explanation of operations.



**A.A.S. Degree Conferred**

## CIVIL ENGINEERING TECHNOLOGY

Construction technicians perform many of the planning and supervisory tasks necessary in the construction of highways, bridges, power plants, dams, missile sites, airfields, water and sewage treatment plants, industrial buildings and utilities. In the planning stages of construction they may be engaged in estimating costs, ordering materials, interpreting specifications, computing earthwork and fills and storm drainage requirements, surveying or drafting. Once the actual construction work has begun, many technicians perform supervisory functions. Some may be responsible for seeing that construction activities are performed in proper sequence, and for inspecting the work as it progresses for conformance with blueprints and specifications.

### OCCUPATIONAL OPPORTUNITIES

An individual upon graduating from this program should qualify for various jobs such as, Instrument Man, Party Chief, Quantity Survey Man, Material Tester (Laboratory Testing), Expediter, Field Clerk, Materials Man, Construction Equipment and Materials Salesman, and Field Draftsman.

<i>Course Title</i>			<i>Class Lab Credit</i>			<i>Course Title</i>			<i>Class Lab Credit</i>		
<i>First Quarter</i>						<i>Third Quarter</i>					
Construction Technology						CIV 312 Surveying III.. 2 6* 4					
CIV 309 Introduction to Con-						CIV 315 Properties of					
struction Technology	2	0	2			Engr. Materials .....	3	4	5		
CIV 310 Surveying I	2	6*	4			MA 303 Technical					
DD 307 General						Mathematics .....	5	0	5		
Drafting .....	2	3*	3			CIV 316 Strength of					
MA 301 Technical						Materials .....	5	0	5		
Mathematics .....	5	0	5			ENG 303 Communicative					
PHY 301 Physics:						Skills: Technical					
Properties of Mater....	3	2	4			Writing .....	3	0	3		
ENG 302 Communicative											
Skills: English.....	3	0	3			Totals .....18 10 22					
Totals .....17 11 21											
<i>Second Quarter</i>						<i>Fourth Quarter</i>					
CIV 311 Surveying II.... 2 6* 4						CIV 313 Surveying IV.. 2 3* 3					
DD 308 General						CIV 317 Construction					
Drafting .....	2	3*	3			Methods and					
MA 302 Technical						Equipment .....	3	2	4		
Mathematics .....	5	0	5			CIV 318 Plain					
PHY 302 Physics: Work,						Concrete .....	2	4	4		
Energy, Power .....	3	2	4			CIV 303 Physics:					
CIV 314 Statics .....	5	0	5			Electricity .....	3	2	4		
Totals .....17 11 21						Totals .....13 13 19					



<i>Course Title</i>	<i>Class Lab Credit</i>			<i>Course Title</i>	<i>Class Lab Credit</i>		
<i>Fifth Quarter</i>				<i>Sixth Quarter</i>			
CIV 320 Construction Planning .....	3	4	5	CIV 324 Shop and Detail Drafting .....	2	3*	3
CIV 321 Reinforced Concrete Construction .....	3	2	4	CIV 325 Construction Estimates and Costs..	3	6	6
CIV 322 Properties of Soils .....	2	4	4	CIV 326 Foundation Construction .....	3	2	4
CIV 323 Codes, Contracts Specifications .....	2	0	2	CIV 327 Construction of Roads and Pavements .....	3	2	4
ISc 301 Industrial Organization and Management .....	3	0	3	SOC 301 Human Relations .....	2	0	2
SOC 302 Economics ....	3	0	3	ENG 304 Communicative Skills: Speech .....	2	0	2
Totals .....	16	10	21	Totals .....	15	13	21

## Civil Engineering Technology

### COURSE DESCRIPTIONS

#### CIV 309 INTRODUCTION TO CONSTRUCTION TECHNOLOGY

By the use of outside speakers, films, and inspection trips to building and highway construction projects the student is introduced to the construction industry and to the characteristics and requirements of his future role as a construction technician.

#### CIV 310 SURVEYING

Theory and practice of plane surveying including taping, differential and profile leveling, cross sections, earthwork computations, transit, stadia, and transit-tape surveys.

Corequisites: MA 301, DD 307.

#### CIV 311 SURVEYING II

Triangulation of ordinary precision; use of plane table; calculation of areas of land; land surveying; topographic surveys and mapping.

Prerequisite: CIV 310.

Corequisites: MA 302, DD 308.

#### CIV 314 STATICS

Forces, resultants, and types of force systems; moments, equilibrium of coplanar forces by analytical and graphic methods; stresses and reactions in simple structures; equilibrium of forces in space; static and kinetic friction; center of gravity, centroids, and moment of inertia.

Corequisite: MA 302.

#### CIV 312 SURVEYING III

Route surveys by ground and aerial methods; simple, compound, reverse, parabolic and spiral curves; geometric design of highways; highway surveys and plans, including mass diagrams.

Prerequisite: CIV 311.

Corequisite: MA 303.

### **CIV 315 PROPERTIES OF ENGINEERING MATERIALS**

Study and testing of the properties of ferrous and nonferrous metals, timber, stone, clay products, bituminous cementing materials; load and strain measurements; behavior of materials under load; qualities other than strength; control of the properties of the materials; non-destructive tests.

Prerequisite: PHY 307.

Corequisite: CIV 316.

### **CIV 316 STRENGTH OF MATERIALS**

Fundamental stress and strain relationship; torsion; shear and bending moments; stresses and deflections in beams; introduction to statically indeterminate beams; columns; combined stresses.

Prerequisite: CIV 314.

Corequisite: MA 303.

### **CIV 313 SURVEYING IV**

Aerial photogrammetry; applications of aerial surveying; building and road construction surveying; lines and grades for foundation layout, building construction, bridge layout, sewer and pipe line surveys.

Prerequisite: CIV 312.

### **CIV 317 CONSTRUCTION METHODS AND EQUIPMENT**

Excavating methods and equipment used in building and highway construction; pile driving; construction techniques and equipment used in reinforced concrete buildings, bridges, life-slabs, thin-shells and folded plates, erection methods and equipment of structural steel buildings and bridges; carpentry in house and heavy timber construction; construction safety. Field inspection trips.

Prerequisites: DD 308, CIV 311.

### **CIV 318 PLAIN CONCRETE**

Study and testing of the composition and properties of concrete including cementing agents, aggregates, admixtures, and air-entrainment; design and proportioning of concrete mixes to obtain pre-determined strengths and properties; methods of placing and pouring concrete; standard control tests of concrete.

Prerequisite: CIV 315.

### **CIV 319 STEEL AND TIMBER CONSTRUCTION**

Analysis and basic design of steel beams, tension members, columns, and riveted, high strength bolted, welded connections; study of plate girders, industrial building roofs and bents, continuous spans, lightweight steel construction; use of American Institute of Steel Construction Manual; introduction to rigid frames and plastic design in steel. Design of timber members and their connections. Field inspection trips.

Prerequisite: CIV 316.

### **CIV 320 CONSTRUCTION PLANNING**

Analysis of construction plant layout requirements and contractor's organization for building and highway projects. Construction scheduling; project control and supervision; coordinating trades on building construction. Operations, charts, and practical application of Critical Path Method (CPM) for construction planning, scheduling, and "time-cost" determination.

Prerequisites: CIV 317, CIV 318, CIV 319.

Corerequisites: CIV 321, CIV 323.



## **CIV 321 REINFORCED CONCRETE CONSTRUCTION**

Analysis and design of reinforced concrete beams, floor systems, and columns. Use of CRSI Design Handbook. Introduction to ultimate strength design. Principles of prestressed and precast concrete. Field inspection trips.

Prerequisite: CIV 316.

## **CIV 322 PROPERTIES OF SOILS**

Study of soil types and their physical properties; mechanical analysis and tests of soils; techniques of subsurface investigation; earth pressure theories; bearing capacity; stability of slopes; hydrostatics of ground water; methods of compaction and consolidation.

Prerequisite: CIV 316.

## **CIV 323 CODES, CONTRACTS AND SPECIFICATIONS**

Basic principles and methods most significant in contract relationships; appreciation of the legal considerations in construction work; study of the National Building Code and local building codes, interpreting and outlining specification.

Prerequisite: None.

## **CIV 324 SHOP AND DETAIL DRAFTING**

Fabricating shop practices for structural and reinforcing steels. Study conventional methods of representation, dimensioning, detailing, makings and connections. Drafting on engineering plans and detailed drawings of structural steel and reinforced concrete buildings and bridges. Detailing parts of steel, timber, and reinforced concrete structures.

Prerequisites: DD 308, CIV 321.

Corequisite: CIV 326.

## **CIV 325 CONSTRUCTION ESTIMATES AND COSTS**

Interpretation of working drawings of timber, structural steel, and reinforced concrete structures, and highways; preparation of material and labor quantity surveys from plans and specifications; approximate and detailed estimates of costs; bidding procedures and preparation of bids.

Prerequisite: CIV 320.

Corequisites: CIV 324, CIV 327.

## **CIV 326 FOUNDATION CONSTRUCTION**

Exploration of sites; study of principles of foundation action; theory and construction practices pertaining to excavation bracing, cofferdams, drainage, stabilization, various types of footings, foundation walls, pile foundations, retaining walls, shoring and underpinning.

Prerequisites: CIV 319, CIV 321, CIV 322.

## **CIV 327 CONSTRUCTION OF ROADS AND PAYMENTS**

Construction practices for various types of road building, including soil properties, grading, subgrading, base courses, drainage, embankments, compaction, and formwork. Design, construction, and testing of rigid portland cement concrete and flexible bituminous payments. Field inspection trips.

Prerequisites: CIV 313, CIV 317, CIV 318, CIV 322.

# School of Industrial Technology

The following areas of study are included in the school of Industrial Technology.

Drafting & Design Technology

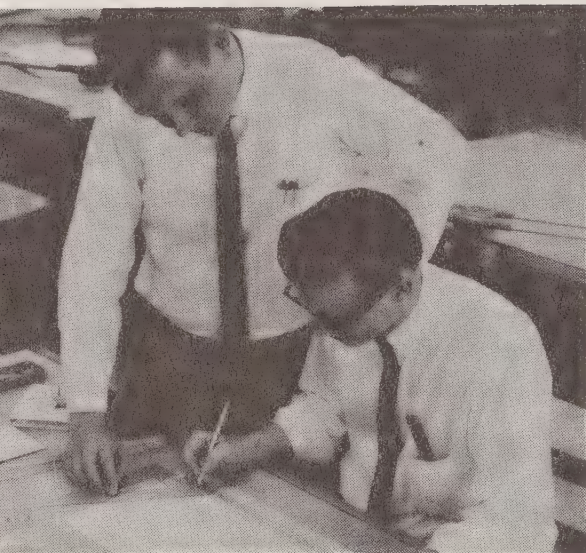
Chemical Technology

All of the areas of study in the School of Industrial Technology are two years in duration and will require about twenty-five to thirty hours per week of study. If a student elects to enroll in the school of Industrial Technology through extension because of his work load, the time required for completion will be doubled. The extension division will offer fifteen hours per week in a particular area of study.

In addition to the regular classroom work each student will be required to spend additional time on outside assignments. The school of industrial technology will require each student to demonstrate an ability to follow an actual production situation from raw material to finished product.

Certain courses are required of every student irrespective of the curriculum area. These courses are core courses and will serve as related areas of study in addition to the subjects required by the curriculum major.





A.A.S. Degree Conferred

## DRAFTING AND DESIGN TECHNOLOGY

The Curriculum for Drafting and Design has been designed to provide optimum specialized technician instruction in a two year program.

The courses are arranged in a sequence that gives the student the required technological and specialized courses as they are needed to coordinate his laboratory experiences.

The curriculum is designed to qualify the graduate for performance of duties in the field of mechanical drafting and design requiring the application of engineering principles, but as applied to the technical rather than the engineering field. As the student develops in drafting skills, mathematics, and related science, a gradual shift is made in the curriculum applying these skills to practical problems in design.

## OCCUPATIONAL OPPORTUNITIES

Typical job opportunities are found in the areas of state government, civil service, construction companies, industries, engineering consulting firms, and architectural firms.

<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Credit</i>	<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Credit</i>
<i>First Quarter</i>				<i>Third Quarter</i>			
DD 301 Technical				DD 303 Technical			
Drafting .....	2	6	4	Drafting .....	2	6	4
MA 301 Technical				MA 303 Technical			
Mathematics .....	5	0	5	Mathematics .....	5	0	5
ENG 301 Communica-				ENG 303 Communica-			
tive Skills: Reading				tive Skills: Technical			
Improvement .....	2	0	2	Writing .....	3	0	3
PHY 301 Physics:				PHY 303 Physics:			
Properties of Matter	3	2	4	Electricity .....	3	2	4
MECH 301 Materials,				MECH 303 Materials,			
Tools, and Processes..	2	2	3	Tools, and Processes	2	2	3
Totals .....	14	10	18	Totals .....	15	10	19
<i>Second Quarter</i>				<i>Fourth Quarter</i>			
DD 302 Technical				DD 304 Technical			
Drafting .....	2	6	4	Drafting .....	2	6	4
MA 302 Technical				DD 310 Descriptive			
Mathematics .....	5	0	5	Geometry .....	2	4	4
ENG 302 Communica-				ENG 304 Communica-			
tive Skills: English	3	0	3	tive Skills: Speech ..	2	0	2
PHY 302 Physics:				ELN 301 Industrial			
Work, Energy, Power	3	2	4	Controls .....	3	2	4
MECH 302 Materials,				MECH 304 Metallurgy..	3	2	4
Tools, and Processes..	2	2	3	Totals .....	12	14	18
Totals .....	15	10	19				

<i>Fifth Quarter</i>				<i>Sixth Quarter</i>			
DD 305 Design				DD 306 Design			
Drafting I .....	2	6	4	Drafting II .....	4	6	6
MECH 305 Strength				DD 312 Jig and			
of Materials .....	3	2	4	Fixture Design .....	2	4	4
PHY 305 Hydraulics				SOC 302 Economics ....	3	0	3
and Pneumatics .....	2	4	4	ISc 301 Industrial			
DD 311 Mechanisms ....	3	2	4	Organization and			
				Management .....	3	0	3
				SOC 301 Human			
				Relations .....	2	0	2
Totals .....	10	14	16	Totals .....	14	10	18

## DRAFTING AND DESIGN TECHNOLOGY

### Course Descriptions

#### DD 301 TECHNICAL DRAFTING

The field of drafting and design is introduced as the student begins study in drafting practices and principles. Basic skills and techniques of drafting included are: use of drafting equipment, lettering, freehand orthographic and pictorial sketching, geometric construction, orthographic instrument drawing of principal views, and standards and practices of dimensioning and noting recommended by the American Standards Association. Methods of reproducing, filing, and storing of drawings are studied and the student is introduced to the "working drawing."

#### MECH 301 MATERIALS, TOOLS, AND PROCESSES

An overall view of the methods and procedures used to transform the raw material into a finished product. Characteristics of metals, woods, and plastics and how these characteristics affect the selection and use of materials and methods of production in the manufacture of an object. Unit production system, sand casting, forging and allied processes, welding, sheet metal working processes, and woodworking processes constitute areas of study.

#### DD 302 TECHNICAL DRAFTING

The application of orthographic projection principles to the more complex drafting problems, primary and secondary auxiliary views, simple and successive revolutions, and sections and conventions will be studied. Most important is the introduction of the graphical analysis of space problems. Problems of practical design elements involving points, lines, planes, and a combination of these elements shall be studied. Dimensioning practices, approved by the American Standards Association, in precision and limit dimensioning will also be included.

#### MECH 302 MATERIALS, TOOLS, AND PROCESSES

Continuation in the study of methods of manufacturing of objects. Confined principally to the machining of materials. The operation of lathes, grinders, drills, milling machines, shapers, planers, metal sawing machines, broaching machines, gear cutting machines, and finishing machines. Dimensional control and precision measuring are an important part of this study.

#### DD 303 TECHNICAL DRAFTING

Intersections and developments and their practical solutions will be studied and, where applicable, model solutions shall accompany the problems. The various types and methods employed to produce isometric and oblique drawings, isometric, dimetric, and trimetric projections, and rendered pictorials will be included.



## **MECH 303 MATERIALS, TOOLS, AND PROCESSES**

Mass-production system is discussed and various methods of production by the processes studied in previous courses are explored. Production in areas of casting, forging, molding, presswork, drilling, boring, reaming, turning, grinding, milling, and surface finishing are studied and design considerations in these areas are determined.

## **DD 304 TECHNICAL DRAFTING**

Applications and constructions of charts, graphs, and nomographs will be studied as to their relationship to engineering and technical data. Screw threads, springs, keys, rivets, piping, and welding symbols, methods of representing and specifying will be covered. Basic mechanisms of motion transfer, gears and cams, will be studied and drawn with emphasis on methods of specifying, calculating dimensions, and delineating.

## **DD 310 DESCRIPTIVE GEOMETRY**

This is a study of the graphical analysis of space problems. The problems deal with practical design elements involving points, lines, planes, connectors, and a combination of these. Also included are problems dealing with solid geometry theorems. Where applicable, each graphical solution shall be accompanied by the analytical solution and visualization shall be stressed on every problem.

## **DD 305 DESIGN DRAFTING I**

Basic design is introduced in the study of motion transfer mechanisms as they relate to power trains. Principles of design sketching, design drawing, layout drafting, detailing from layouts, production drawings, and simplified drafting practices constitute areas of study. Types and methods of specifying materials and workmanship are an integral part of the course.

## **MECH 305 STRENGTH OF MATERIALS**

A study of the stresses and strains that occur in materials when subjected to tensile, compressive, and/or shearing forces. Stresses in thin-walled cylinders, riveted and welded joints, shear and bending moment diagrams, deflection, eccentrically applied loads, torsion, and factors of column design.

## **PHY 305 HYDRAULICS AND PNEUMATICS**

The basic theory of hydraulic and pneumatic systems and their combinations in various circuits. Function and basic design of circuits and motors, controls, electrohydraulic servo elements, plumbing, filtration, accumulators and reservoirs, constitute major areas of study.

## **DD 311 MECHANISMS**

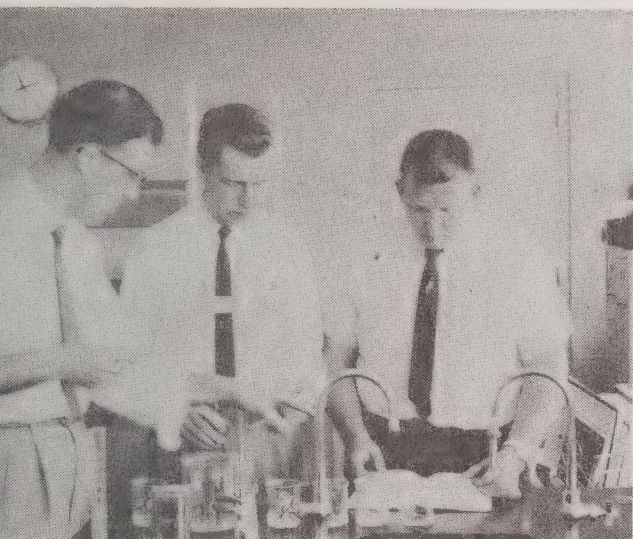
This course consists of mathematical and drafting room solutions of problems involving the principal machine elements. Included is a study of motions of linkage, velocities and acceleration of points within a link mechanism, and layout methods for designing cams, belting, pulleys, gears, and gear trains.

## **DD 306 DESIGN DRAFTING II**

Research to solve a problem in design by consulting various manuals, periodicals, and through laboratory experiments. A written technical report, preliminary design sketches, layout drawings, detail drawings, assembly and sub-assembly drawings, pictorial drawings, exploded pictorial assembly, patent drawings, and specifications are required as a part of the problem.

## **DD 312 JIG AND FIXTURE DESIGN**

Designed to give the student a thorough knowledge of the principles, practices, tools, and commercial standards of jig and fixture design. Through lectures, visual aids, and individual project and design work, the student becomes well acquainted with the many types of jig and fixtures and their design.



A.A.S. Degree Conferred

## CHEMICAL TECHNOLOGY

The chemical technology student studies the fundamentals of general chemistry and organic chemistry and learns how to perform qualitative, and analytical analyses. The student will study substance and the reactions between them and learns the methods and procedures used in the discovery and development of new products. In the unit operation laboratory the student will learn material handling; crushing, grinding, and sizing; he studies chemical machinery and methods used in extraction, distillation, evaporation, drying, absorption, and heat transfer. He also devises, installs, and operates chemical manufacturing processes.

## OCCUPATIONAL OPPORTUNITIES

The chemical technology graduate will find employment in a wide variety of fields such as foods, metals, paints, glass, plastics, rubber, fuels, paper, building products, dyes, oils, lubricants, and heavy chemicals.

This individual will fill such jobs as Research Assistant, Control Chemist, Laboratory Technician, Chemical Analyst, and Pilot Plant Foreman.

Course Title	Class	Lab	Credit	Course Title	Class	Lab	Credit
<i>First Quarter</i>				<i>PHY 303 Physics:</i>			
CHEM 310 General Chemistry	3	6	6	Electricity	3	2	4
MA 301 Technical Mathematics	5	0	5	Totals	14	8	18
ENG 301 Communicative Skills: Reading Improvement	2	0	2	<i>Fourth Quarter</i>			
PHY 301 Physics: Properties of Matter	3	2	4	CHEM 313 Quantitative Chemical Analysis	2	10	7
Totals	13	8	17	MA 304 Technical Mathematics	3	0	3
<i>Second Quarter</i>				ISc 301 Industrial Organization and Management	3	0	3
CHEM 311 General Chemistry	3	6	6	CHEM 314 Physical Chemistry	3	2	4
MA 302 Technical Mathematics	5	0	5	Totals	11	12	17
ENG 302 Communicative Skills: English	3	0	3	<i>Fifth Quarter</i>			
PHY 302 Physics: Work, Energy, Power	3	2	4	CHEM 315 Organic Chemistry	3	6	6
Totals	14	8	18	SOC 302 Economics	3	0	3
<i>Third Quarter</i>				CHEM 317 Industrial Chemical Analysis	3	10	8
CHEM 312 Quantitative Chemical Analysis	3	6	6	Totals	9	16	17
MA 303 Technical Mathematics	5	0	5	<i>Sixth Quarter</i>			
ENG 303 Communicative Skills: Technical Writing	3	0	3	CHEM 316 Organic Chemistry	2	6	5
				CHEM 318 Industrial Chemical Analysis	5	10	10
				Totals	7	16	15



# CHEMICAL TECHNOLOGY

## Course Descriptions

### CH 310 GENERAL CHEMISTRY

An introductory course serving as a base for future development in the chemical areas. Chemical terms, systems of measurement, atomic structure, states of matter, and the properties of elements, compounds, and mixtures constitute major fields of study. Laboratory work consists of various inorganic reactions and preparations.

### CH 311 GENERAL CHEMISTRY

A study of the properties of gases, types of chemical reactions, equivalent weights, combining properties of the elements, functions of the periodic table, and properties of electrolytes and nonelectrolytes. Classroom theory is supported by extensive laboratory work, preparing and studying the behavior of gases, types of chemical reactions, and properties of solutions.

### CH 312 QUANTITATIVE ANALYSIS

Emphasis is placed on developing laboratory techniques employed in the volumetric analysis of acids and bases. The students will become thoroughly familiar with the principles and procedures of neutralization titration. Classroom work will emphasize the stoichiometric calculations involved in interpreting the results of analysis. Laboratory work will consist of percentage analysis of selected substances.

### CH 313 QUANTITATIVE ANALYSIS

This quarter is devoted to the more complex types of volumetric analysis. Special emphasis is placed on the theory of oxidation reduction and gravimetric analysis. The student will become familiar with the principles of redox reactions, ionization constants, and PH of solutions. Stress is placed on the stoichiometric calculations of analysis. Classroom work is supported with quantitative determinations in the laboratory.

### CH 314 PHYSICAL CHEMISTRY

Atomic theory, states of matter, chemical thermodynamics, molecular properties solutions, equilibria, phase rule, electro-chemistry, kinetics, surface chemistry, and photochemistry constitute major areas of study. Experiments, selected by the instructor, serve as a basis for laboratory work.

### CH 315 ORGANIC CHEMISTRY

The nomenclature, structure, preparation, properties, and reactions of aliphatic organic compounds constitute major areas of study. Laboratory work emphasizes techniques, and selected preparations.

### CH 317 INDUSTRIAL CHEMISTRY

A course designed to incorporate the chemical needs of industry in the area adjacent to a particular center so that the principles and techniques learned in previous quarters can be applied by the student to practical problems. An actual plant production situation is simulated and a solution effected based on the student's background of chemical knowledge. It will be the responsibility of the instructor to determine and submit in outline form a program of suitable scope and sequence of topics which

he will work out from consultation with his local advisory committee, representing the industry. This program must be approved by the center director and accepted by the appropriate state level authority.

#### CH 316 ORGANIC CHEMISTRY

The nomenclature, structure, preparation, properties, and reactions of aromatic organic compounds. Laboratory work emphasizes techniques; invalues preparation and analyses of selected organic compounds.

#### CH 318 INDUSTRIAL CHEMISTRY

A continuation of Industrial Chemistry I. A simulated plant situation is maintained and the chemical background of the student is utilized fully. Problems of plant layout and design, organization and management, and percentage yield are considered. The student will draw from his experiences in the related areas of mathematics, industrial organization and management, and technical report writing in maintaining complete and accurate records of all phases of the operation. When feasible some related work should be done in the Mechanical and Drafting and Design areas, giving the student an understanding of the problems encountered in these specialty fields.



## School of Business Education

The following areas of study are included in the school of Business Education.

Data Processing Technology (Business)

Business Administration

All of the areas of study in the School of Business Education are two years in duration and will require from twenty to thirty hours per week of course work. If a student elects to enroll in the school of Business Education through extension because of his work load, the time required for completion will be doubled. The extension or evening school division will offer fifteen hours per week in a particular area of study.

In addition to regular classroom work each student will be required to spend additional time on outside work assignments.

The school of Business Education will require each student to become fully aware of the latest methods employed in the business world.



## DATA PROCESSING TECHNOLOGY

The data processing courses are arranged in a workable sequence suitable to the instructional needs of the students with an appropriate balance between technical courses, general education courses, and laboratory exercises. The arrangement of the curriculum is such that it proceeds from elementary work to work that is more complex. Within the subject material of each course the concepts are solidified through practical application. The outline below is the business approach; however, it is possible for the student to elect certain subjects and study in the scientific area of data processing.

**A.A.S. Degree Conferred**

### OCCUPATIONAL OPPORTUNITIES

Typical occupational opportunities are found in banking, civil service, industry, business, and insurance companies. Research activities also utilize trained persons in this field.

Course Title	Class	Lab	Credit	Course Title	Class	Lab	Credit
<b>First Quarter</b>				<b>Fourth Quarter</b>			
MA 311 Numbering Systems and Boolean Algebra	5	0	5	DP 314 Scientific Programming	2	4	4
DP 310 Functional Wiring Principles	4	6	7	BUS 322 Accounting	5	2	6
BUS 309 Business Machines	0	4	2	MA 315 Statistics	5	0	5
DP 311 Introduction to Data Processing Systems	3	2	4	ENG 304 Communicative Skills-Speech	2	0	2
ENG 301 Reading Improvement	2	0	2	MA 316 Calculus	3	0	3
Total	14	12	20	Total	17	6	20
<b>Second Quarter</b>				<b>Fifth Quarter</b>			
MA 312 Algebra	5	0	5	BUS 323 Cost Accounting	4	2	5
DP 312 Fundamentals of Programming	5	0	5	DP 315 Linear Programming	2	4	4
BUS 320 Accounting	5	2	6	SOC 302 Economics	3	0	3
ENG 302 Communicative Skills-English	3	0	3	CHEM 301 General Chemistry	3	2	4
ISc 301 Industrial Organization and Management	3	0	3	ELEC 309 Electrical Fundamentals	3	2	4
Total	21	2	22	Total	15	10	20
<b>Third Quarter</b>				<b>Sixth Quarter</b>			
MA 313 Trigonometry	5	0	5	BUS 318 Business Law	5	0	5
DP 313 Business Programming	2	4	4	BUS 324 Machine Accounting Problems	0	4	2
BUS 321 Accounting	5	2	6	BUS 325 Practical Accounting Problems	0	10	5
MA 314 Statistics	5	0	5	DP 316 Research	5	4	7
ENG 303 Communicative Skills-Tech. Writing	3	0	3	SOC 301 Human Relations	2	0	2
Total	20	6	23	Total	12	18	21



# DATA PROCESSING

## Course Descriptions

### MA 311 NUMBERING SYSTEM AND BOOLEAN ALGEBRA

A cursory treatment of our present numbering system; development of new systems; transformation from one system to another; fundamental operation in systems other than the decimal; a detailed study of the binary system in relation to machine calculations; principles of Boolean Algebra and its contribution to digital devices and data processing. Prerequisite: None.

### DP 310 FUNCTIONAL WIRING PRINCIPLES

The fundamental principles of wiring necessary to perform basic machine functions of printing, punching, comparing, and selection. A series of laboratory experiments support the theoretical aspects of this course. Prerequisite: None.

### BUS 309 BUSINESS MACHINES

Designed to serve as a general survey of the entire field of business and office machines. Students will receive training in techniques, processes, operation, and application of 10 key adding machine, full-keyboard adding machine, calculator, posting and accounting machines, IBM card punch, and IBM card verifier.

### DP 311 INTRODUCTION TO DATA PROCESSING SYSTEMS

A study of the fundamental concepts and operational principles of data processing systems. They are presented as an aid in developing a basic knowledge of computers as a prerequisite to the detail study of particular computer problems. This course also provides a general knowledge of computing systems and is a prerequisite for all programming courses. Prerequisite: None.

### MA 312 ALGEBRA

A study of fundamental operations in algebra, exponents and radicals; functions and graphs; linear equations; simultaneous linear equations; quadratic equations; simultaneous quadratic equations; ratio, proportion, and variation; binomial theorem; progressions, and logarithms. Prerequisite: (Entrance Requirements).

### DP 312 FUNDAMENTALS OF PROGRAMMING

The student will study the functions and capabilities of a specific data processing machine and will become familiar with some of the tools and raw material necessary for becoming a programmer. Programming drills, exercises, and case studies will serve to bridge the gap from the theoretical to the real world of data processing. Prerequisites: DP 310, DP 311.

### BUS 320 ACCOUNTING

This course emphasizes the principles, techniques, and tools of accounting. It provides the necessary background understanding of the mechanics of accounting — collecting, summarizing, analyzing, and reporting information about the business. A thorough study is made of both service

and mercantile enterprises and will include a practice set which will provide practical application of the principles learned. Prerequisite: None.

### MA 313 TRIGONOMETRY

A study of the trigonometric functions; radian measure; fundamental identities; trigonometric equations; logarithms of trigonometric functions; solution of right and oblique triangles with and without logarithms; inverse trigonometric equations; and graphical representation of the trigonometric functions. Prerequisite: MA 312.

### DP 313 BUSINESS PROGRAMMING

The effective use of data processing equipment in meeting the information needs of business; utilizing the symbolic programming system as a tool in the solution of problems. This course is designed to guide the student through the stages in the evolution of a system. The scope of the system developed will vary from a modest payroll procedure to the total information system of a large and complex business. Prerequisites: DP 312, MA 312.

### BUS 321 ACCOUNTING

Partnership and corporate forms of business including a study of payrolls, Federal and State taxes. Emphasis is placed on recording, summarizing, and interpreting data for management control rather than on bookkeeping skills. Accounting services are shown as they contribute to the recognition and solution of a management problem. Prerequisite: BUS 320.

### MA 314 STATISTICS

The theory of statistics and its application in modern business. The student will gain an understanding of the kinds of regularity that exist among random fluctuations. He will gain experience in associating and using mathematical models to interpret physical phenomena and predicting, with reasonable certainty, the outcomes of experiments related to practical business problems. Prerequisite: MA 312.

### DP 314 SCIENTIFIC PROGRAMMING

Designed to provide the student with sufficient knowledge of programming systems concepts so that he may easily master any specific system with a minimum of instruction. He will analyze, evaluate, and make minor modifications to such systems. Individual phases of certain selected systems are treated in detail in order that the student may learn advanced programming and logic decision techniques as applied in sophisticated systems. Prerequisites: DP 313, MA 313.

### BUS 322 ACCOUNTING

The student is given a thorough knowledge of concepts used in the preparation and interpretation of financial statements. Each item of the income statement and balance sheet is carefully analyzed prior to making a selection as to how these items will be utilized. Prerequisite: BUS 321.

### MA 315 STATISTICS

A continuation of MA 314. There will be practical experiences in the statistical solution of business problems through the use of computers. Methods of organizing and presenting data with intelligent interpretations are emphasized throughout this course. Prerequisite: MA 314.



## MA 316 CALCULUS

A course designed to familiarize the student with fundamental concepts of differential and integral calculus; standard formulas for differentiating standard integration formulas; algebraic and trigonometric functions; use of integral tables; and various applications not requiring a knowledge of analytic geometry. Prerequisite: MA 313.

## BUS 323 COST ACCOUNTING

An understanding of the basic concept of the cost accounting function within a manufacturing organization. Material costs, labor costs, manufacturing overhead, and marketing cost that enter the cost accounting system are treated in detail. Prerequisite: BUS 322.

## DP 315 LINEAR PROGRAMMING

Lecture and case problems encompassing the scope and potential of using mathematical programming with computers to increase industrial efficiency. This course presents the network technique of management planning, scheduling, and control. Basic rules of network planning are presented with laboratory assignments designed to implement the theoretical aspects of Critical Path Method (CPM)). Prerequisites: DP 314, MA 316.

## SOC 302 ECONOMICS

The fundamental principles of economics including institutions and practices by which people gain a livelihood. Included is a study of the laws of supply and demand and the principles bearing upon production, exchange, distribution, and consumption both in relation to the individual enterprise and to society at large. Prerequisite: None.

## BUS 318 BUSINESS LAW

An understanding of basic business laws as they relate to business. The law of contracts, negotiable instruments, agency, partnership, corporation, deeds of conveyance, etc. will be covered as they regulate the relations of one business to another as well as laws that control relations of an enterprise with its employees and/or its customers. This course is no more than a skeleton outline of principles and a limited number of illustrations of these principles. Prerequisite: None.

## BUS 324 MACHINE ACCOUNTING PROBLEMS

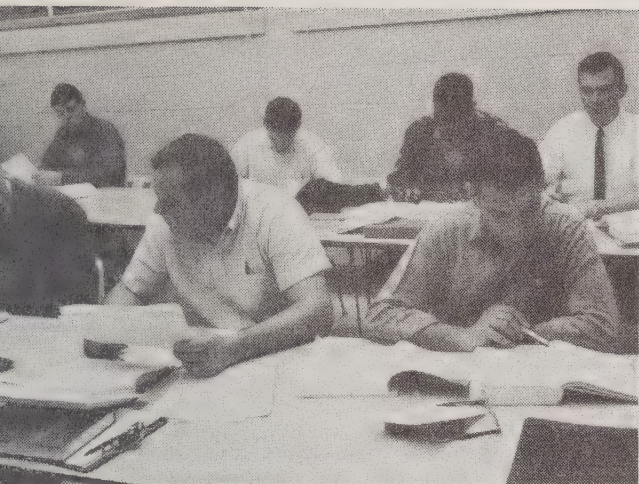
This course is designed to interweave the student's knowledge of electronic data processing equipment and his knowledge of accounting theory. It is a practical approach to the use of electronic machines in the solution of accounting problems. Prerequisites: BUS 323, DP 313.

## BUS 325 PRACTICAL ACCOUNTING PROBLEMS

The individual is introduced to a practical accounting problem. The student will be required to maintain business and accounting records showing daily transactions of a small business. The evaluation of the student's performance during this period will be a co-operative effort engaged in by locally assigned business personnel and faculty members. The primary purpose of this session is to give the student an overview of practical accounting procedures. Prerequisite: BUS 323.

## DP 316 RESEARCH

Individual assignments in a carefully selected project will be assigned to the student during this quarter of work. It will give the student an opportunity to initiate and carry out a project taken from outside the school. This course places the responsibility upon the student to solve a significant problem with minimum of teacher assistance. Prerequisites: DP 315, BUS 323.



# BUSINESS ADMINISTRATION

In North Carolina the opportunities in business are increasing. With the increasing population and industrial development in this State, business has become more competitive and automated. Better opportunities in business will be filled by students with specialized education beyond the high school level. The Business Administration Curriculum is designed to prepare the student for employment in one of many occupations common to business. Training is aimed at preparing the student in every phase of administrative work that might be encountered in the average business.

## A.A.S. Degree Conferred

The specific objectives of the Business Administration Curriculum are to develop the following competencies:

1. Understanding of the principles of organization and management in business operations.
2. Understanding and skill in effective communication for business.
3. Knowledge of human relations as they apply to the successful operations in the rapidly expanding economy.

## OCCUPATIONAL OPPORTUNITIES

The graduate of the Business Administration Curriculum may enter a variety of career opportunities from beginning sales person or office clerk to manager trainee. The duties and responsibilities of this graduate vary in different firms. These encompassments might include: making up and filing reports, tabulating and posting data in various books, sending out bills, checking calculations, adjusting complaints, operating various office machines, and assisting manager in supervising. Positions are available in businesses such as advertising; banking; credit; finance; retailing; wholesaling; hotel, tourist, and travel industry; insurance; transportation; and communications.

Course Title			Class Lab Credit			Course Title			Class Lab Credit		
First Quarter						Second Quarter					
ENG 302 Communicative Skills: English .....			3	0	3	ENG 305 Communicative Skills: Report Writing .....			3	0	3
BUS 302 Typewriting Or Elective)* .....			1	4	3	BUS 320 Accounting ....			5	2	6
MA 310 Business Mathematics .....			3	0	3	BUS 352 Business Law..			3	0	3
BUS 301 Introduction to Business .....			3	0	3	SOC 302 Economics ....			3	0	3
BUS 351 Business Law..			3	0	3	BUS 339 Marketing .....			3	0	3
BUS 317 Sales Development .....			3	0	3				—	—	—
Totals .....			16	4	18	Totals .....			17	2	18
Course Title			Class Lab Credit			Course Title			Class Lab Credit		
Third Quarter						Fourth Quarter					
ENG 306 Communicative Skills: Business Communications .....			3	0	3	ENG 307 Communicative Skills: Oral Communications .....			3	0	3
BUS 355 Interpreting Accounting Records..			3	0	3	BUS 364 Business Finance .....			3	0	3
SOC 304 Economins ....			3	0	3						



BUS 316 Retailing .....	3	0	3	BUS 366 Budget and Record Keeping .....	3	0	3
BUS 328 Business Insurance .....	3	0	3	DP 311 Introduction to Data Processing Systems .....	3	2	4
BUS 360 Office Machines .....	2	2	3	BUS 337 Wholesaling....	3	0	3
	<hr/>	<hr/>	<hr/>		<hr/>	<hr/>	<hr/>
Totals .....	17	2	18	Totals .....	18	2	19

<i>Fifth Quarter</i>			
ENG 304 Communicative Skills: Speech .....	2	0	2
BUS 365 Business Finance .....	3	0	3
BUS 327 Advertising ....	3	2	4
BUS 335 Business Management .....	3	0	3
SOC 310 Applied Psychology .....	3	0	3
Electives ** .....	3	0	3
	<hr/>	<hr/>	<hr/>
Totals .....	17	2	18

Electives ** .....	3	0	3
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<i>Sixth Quarter</i>			
BUS 368 Taxes .....	3	0	3
BUS 333 Personnel Management .....	3	0	3
BUS 332 Sales Promotion Management .....	3	0	3
BUS 372 Principles of Supervision .....	3	0	3
Electives ** .....	5	0	5
	<hr/>	<hr/>	<hr/>
Totals .....	17	0	17

\*\* Elective courses must be selected from the associate degree curriculum. The institution may elect to require certain courses or may let the student have a free elective.

## Business Administration

### BUS 302 TYPEWRITING

Introduction to the touch typewriter system with emphasis on correct techniques, mastery of the keyboard, simple business correspondence, tabulation, and manuscripts. Minimum speed of 30 words per minute for five minutes.

### MA 310 BUSINESS MATHEMATICS

This course stresses the fundamental operations and their application to business problems. Topics covered include payrolls, price marking, interest and discount, commission, taxes, and pertinent uses of mathematics in the field of business.

Prerequisite: None.

### BUS 301 INTRODUCTION TO BUSINESS

A survey of the business world with particular attention devoted to the structure of the various types of business organizations, methods of financing, internal organization, and management.

Prerequisite: None.

### BUS 351 BUSINESS LAW

A general course designed to acquaint the student with certain fundamentals and principles of business law, including contracts, negotiable instruments, partnerships, corporations, and agencies.

Prerequisite: None.

### BUS 317 SALES DEVELOPMENT

A study of retail, wholesale and specialty selling. Emphasis is placed upon mastering and applying the fundamentals of selling. Preparation for and execution of sales demonstrations required.

Prerequisite: None.

### ENG 305 COMMUNICATIVE SKILLS: REPORT WRITING

A study and practice in the fundamentals of report writing, including style and mechanics in preparing reports of various types, which are most likely to be used by people engaged in business and the professions.

Prerequisite: ENG 302.

### **BUS 320 ACCOUNTING**

Principles, techniques and tools of accounting, for understanding of the mechanics of accounting — collecting, summarizing, and reporting information about service and merchantile enterprises, to include practical application of the principles learned.

Prerequisite: None.

### **BUS 352 BUSINESS LAW**

Includes the study of laws pertaining to bailments, sales, risk-bearing, partnership-corporation, mortgages, and property rights.

Prerequisite: BUS 351.

### **BUS 339 MARKETING**

A study of the marketing structure within the framework of the U. S. economic system. It includes the study of the movement of goods from producer to consumer through various channels of distribution, the functions of marketing, the social and economic implications.

Prerequisite: None.

### **ENG 306 COMMUNICATIVE SKILLS: BUSINESS COMMUNICATIONS**

Develops skills in techniques in writing business communications. Emphasis is placed on writing action — getting sales letters and prospectuses. Business reports, summaries of business conferences, spot announcements for radio and television as well as letters involving credit, collections, adjustments, complaints, orders, acknowledgments, remittances, and inquiry are also included in this course.

Prerequisite: ENG 305.

### **BUS 355 INTERPRETING ACCOUNTING RECORDS**

Designed to aid the student in developing a "use understanding" of accounting records, reports and financial statements. Interpretation, analysis, and utilization of accounting statements.

Prerequisite: BUS 320.

### **SOC 304 ECONOMICS**

Greater depth in principles of economics, including a penetration into the composition and pricing of national output, distribution of income, international trade and finance, and current economic problems.

Prerequisite: SOC 302.

### **BUS 316 RETAILING**

A study of the role of retailing in the economy including development of present retail structure, functions performed, principles governing effective operation and managerial problems resulting from current economic and social trends.

Prerequisite: None.

### **BUS 328 BUSINESS INSURANCE**

A presentation of the basic principles of risk insurance and their application. A survey of the various types of insurance is included.

Prerequisite: None.

### **BUS 360 OFFICE MACHINES**

A general survey of the business and office machines. Students will receive training in techniques, processes, operation and application of the ten-key adding machines, full keyboard adding machines, calculator, and duplicating equipment.

Prerequisite: None.

### **ENG 307 COMMUNICATIVE SKILLS: ORAL COMMUNICATIONS**

Including study in areas of face-to-face conversation, delegating and accepting, understanding, listening, questioning, conferences, and the use of words.

Prerequisite: BUS 306.

### **BUS 364 BUSINESS FINANCE**

Financing of business units, as individuals, partnerships, corporations, and trusts. A detailed study is made of the organization, anagement, and financing of businesses.

Prerequisite: None.



### **BUS 366 BUDGET AND RECORD KEEPING**

The basic principles, methods, and procedures for preparation and operation of budgets. Special attention is given to the involvement of individual departments and the role they play. Emphasis on the necessity for accurate record keeping in order to evaluate the effectiveness of budget planning.

Prerequisite: BUS 320.

### **DP 311 INTRODUCTION TO DATA PROCESSING SYSTEM**

Fundamental concepts and operational principles of data processing systems, as an aid in developing a basic knowledge of computers, prerequisite to the detail study of particular computer problems. This course is a prerequisite for all programming courses.

Prerequisite: None.

### **BUS 307 WHOLESALING**

The development of wholesaling; present-day trends in the United States. A study of the functions of wholesaling.

Prerequisite: None.

### **BUS 365 BUSINESS FINANCE**

An advanced course designed to give the student practical knowledge of the different kinds of stocks and bonds, mortgages, working capital, sinking funds, capitalization, sales of securities, surplus and dividends.

Prerequisite: BUS 364.

### **BUS 327 ADVERTISING**

The role of advertising in a free economy and its place in the media of mass communications. A study of advertising appeals; product and market research; selection of media; means of testing effectiveness of advertising. Theory and practice of writing advertising copy for various aidem.

### **BUS 325 BUSINESS MANAGEMENT**

Principles of business management including overview of major functions of management such as planning, staffing, controlling, directing, and financing. Clarification of the decision-making function versus the operating function. Role of management in business — qualifications and requirements.

Prerequisite: None.

### **SOC 310 APPLIED PSYCHOLOGY**

This course stresses the procedures of building an efficient, enthusiastic business team and deals with the nature of the problems which arise in business organizations. The individual and his behavior are discussed, as well as the problems of influence and authority.

Prerequisite: None.

### **BUS 368 TAXES**

Application of Federal and State taxes to various businesses and conditions. A study of the following taxes: income, payroll, intangible, capital gain, sales and use, excise, and inheritance.

### **BUS 333 PERSONNEL MANAGEMENT**

Principles of human relationships; selection of personnel by interviewing and testing; and training of personnel.

Prerequisite: None.

### **BUS 332 SALES PROMOTION MANAGEMENT**

The scope and activities of sales promotion with emphasis on the coordination of advertising, display, special events, and publicity. External and internal methods of promoting business; budgeting, planning, and implementing the plan.

Prerequisite: BUS 327.

### **BUS 372 PRINCIPLES OF SUPERVISION**

Introduces the basic responsibilities and duties of the supervisor and his relationship to superiors, subordinates, and associates. Emphasis on securing an effective work force and the role of the supervisor. Methods of supervision are stressed.

Prerequisite: None.

## School of Trades

The following areas of study are included in the School of Trades.

Tool and Die Making

Machine Shop

Welding

Automotive Mechanics

Air Conditioning-Refrigeration and Sheet Metal

Heavy Equipment Maintenance  
(with Farm Machinery option)

Carpentry and Cabinet Making

Practical Nurse Education

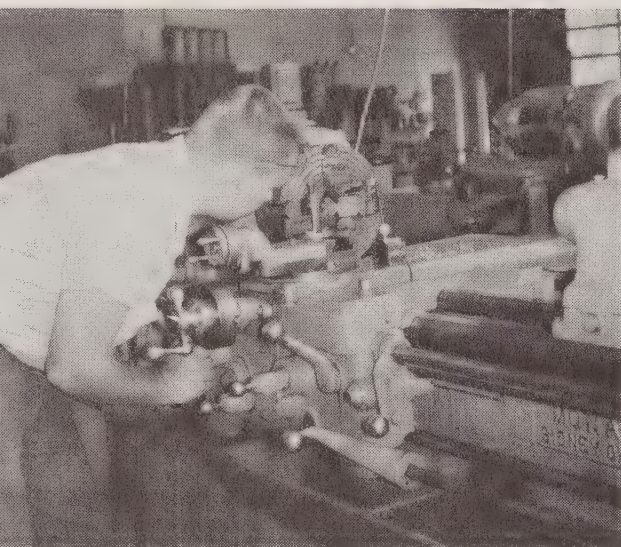
Radio and Television Servicing

The School of Trades will offer a variety of courses on a 4 quarter basis. The areas of study reflect the employment opportunities in the Western part of North Carolina. These curriculums require one full year for completion, with the exception of Welding. Welding is a nine months course. If a student elects to enroll in the School of Trades through extension because of his work load, the time required for completion will be doubled. The extension division will offer fifteen hours per week in a particular area of study. The full time schedule will require thirty hours per week.

The student enrolled in the School of Trades will spend most of his time in the shop working under actual industrial conditions. The rest of the time will be in the classroom and laboratory in related subjects. The School of Trades will require each student to demonstrate an ability to do work in his particular trade. Emphasis will be placed on becoming proficient in the use of machines, instruments, and other equipment related to a particular area of work.

Certain courses will be required of every student irrespective of his curriculum. These courses will enhance the student's ability to become a total individual with a proper attitude toward his work. A thorough understanding of the American system of Economics as it relates to the free enterprise system and corporate structure will be required of every student.





State Diploma Awarded

# MACHINE SHOP

The two objectives of the machine shop course are to help men now in machine shops get a solid working knowledge of overall machine shop practice and to provide men not working in machine shops with a broad understanding of machine tools and shop practices. This course presents in a practical manner the details of such basic shop operations as bench work, layout, drilling, lathe work, milling, shaping, planing, broaching, and grinding. The course also covers the operating principles of machine tools, the use of measuring and testing instruments, and blueprint reading.

## OCCUPATIONAL OPPORTUNITIES

Occupational opportunities are found in metal working factories, federal government installations, machine shops, maintenance shops, utility companies, and a wide variety of mechanical and technical activities.

Course Title	Class	Lab	Shop	Credit	Course Title	Class	Lab	Shop	Credit
<i>First Quarter</i>					<i>Third Quarter</i>				
MECH 121 Machine Shop Theory and Practice	3	0	12	7	MECH 123 Machine Shop Theory and Practice	3	0	12	7
MA 120 Fundamentals of Mathematics	5	0	0	5	MECH 124 Structure of Metals	3	2	0	4 ✓
DD 122 Blueprint Reading	5	0	0	5	PHY 105 Applied Physics II	1	2	0	2
ENG 101 Reading Improvement	2	0	0	2	SOC 101 Human Relations	2	0	0	2
Totals	15	0	12	19	Totals	9	4	12	15
<i>Second Quarter</i>					<i>Fourth Quarter</i>				
MECH 122 Machine Shop Theory and Practice	3	0	12	7	MECH 125 Machine Shop Theory and Practice	3	0	12	7
MA 123 Machinist Mathematics	5	0	0	5	ISc 101 Industrial Specifications	2	0	0	2
DD 123 Blueprint Reading	3	0	0	3	MECH 111 Oxyacetylene Welding	2	0	3	3
PHY 104 Applied Physics I	1	2	0	2	MECH 126 Heat Treating Practice	0	0	3	1
ENG 102 Communication Skills	2	0	0	2	ISc 102 Industrial Organizations	3	0	0	3
Totals	14	2	12	19	Totals	10	0	18	16

# MACHINE SHOP

## Course Descriptions

### MECH 121 MACHINE SHOP THEORY AND PRACTICE

An introduction to the machinist trade and the potential it holds for the craftsman. Deals primarily with the identification, care, and use of basic hand tools and precision measuring instruments. Elementary layout procedures and processes on lathe, drill press, grinding (off-hand) and milling machines will be introduced both in theory and practice. Prerequisite: None.

### MECH 122 MACHINE SHOP THEORY AND PRACTICE

Advanced operations in layout tools and procedures, power sawing, drill press, surface grinder, milling machine, and shaper. The student will be introduced to the basic operations on the cylindrical grinder and will select a project encompassing all the operations, tools, and procedures thus far used and those to be stressed throughout the course. Prerequisite: MECH 121.

### MECH 123 MACHINE SHOP THEORY AND PRACTICE

Advanced work on the engine lathe, turning, boring and threading machines, grinders, milling machine, and shaper. Introduction to basic indexing and terminology with additional processes on calculating, cutting and measuring of spur, helical, and worm gears and wheels. The trainee will use precision tools and measuring instruments such as vernier height gages protractors, comparators, etc. Basic exercises will be given on the turret lathe and tool and cutter grinder. Prerequisites: MECH 121, 122.

### MECH 124 STRUCTURE OF METALS

Elementary and practical approach to metals, their structure, markings, classifications, and uses. Interpretation of properties and specifications of steels by use of manuals, catalogs, charts, etc. Prerequisite: None.

### MECH 125 MACHINE SHOP THEORY AND PRACTICE

Development of class projects using previously learned procedures in planning, blueprint reading, machine operations, final assembly, and inspection. Additional processes on the turret lathe, tool and cutter grinder, cylindrical and surface grinder, advanced milling machine operations, etc. Special procedures and operations, processes and equipment, observing safety procedures faithfully and establishing of good work habits and attitudes acceptable to the industry. Prerequisites: MECH 121, 122, 123.

### ISc 101 INDUSTRIAL SPECIFICATIONS

The "what" and "why" of specifications. Organizing and studying machine tool and hand tool specifications, job sheets, and procedure sheets. Catalogs, specification sheets, and manufacturer's handbooks serve as reference sources. Prerequisite: None.

### MECH 111 OXYACETYLENE WELDING

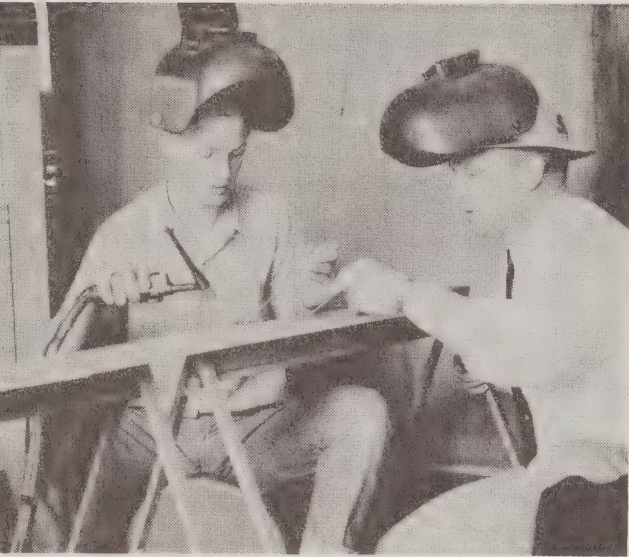
Basic welding procedures and practice. The trainee will gain experience in the gas welding of small parts and tools. This course will present gas welding as it may be used by the machinist in the repair and manufacture of tools and equipment. Prerequisite: None.

### MECH 126 HEAT TREATING PRACTICE

Working knowledge of methods of treating ferrous and nonferrous metals. The effects of hardening, tempering, and annealing upon the structure and physical properties of metals. Trainees will be given the opportunity to acquaint themselves with the equipment and processes needed in heat treating. Prerequisite: MECH 124.



## WELDING



The purpose of this course is to provide a sound training program of the skills involved in welding along with a background of technical information needed by the modern welder.

The curriculum is designed to give the student a sound foundation in the principles, practices, and usages of both gas and electric welding in modern industry. At the same time he will be given ample practice in the welding skills. In the shop theory and practice are combined under the guidance of an instructor thoroughly competent in the trade. In addition, instruction is given in the technical fields related to welding under the instruction of specialists in the technical fields.

**State Diploma Awarded**

## OCCUPATIONAL OPPORTUNITIES

Typical occupational opportunities are found in motor vehicle and equipment plants, air craft industry, construction companies, independent metal working repair shops, steel mills, and self-employment.

<i>First Quarter</i>	<i>Class</i>	<i>Lab.</i>	<i>Shop</i>	<i>Prac.</i>	<i>Credit</i>
MA 120 Fundamentals of Mathematics .....	5	0	0		5
MECH 124 Structure of Metals .....	3	2	0		4
WELD 110 Hand and Power Tools .....	0	0	3		1
DD 122 Blueprint Reading .....	5	0	0		5
WELD 120 Oxyacetylene Welding and Cutting .....	3	0	9		6
<b>Total</b> .....	<b>16</b>	<b>2</b>	<b>12</b>		<b>21</b>

<i>Second Quarter</i>					
ENG 101 Reading Improvement .....	2	0	0		2
MA 121 Geometry .....	3	0	0		3
DD 127 Blueprint Reading .....	3	0	0		3
ELEC 117 Basic Electricity .....	3	0	0		3
WELD 111 Arc Welding .....	3	0	12		7
<b>Total</b> .....	<b>14</b>	<b>0</b>	<b>12</b>		<b>18</b>

<i>Third Quarter</i>					
WELD 112 Mechanical Testing and Inspection .....	0	0	6		3
SOC 101 Human Relations .....	2	0	0		2
WELD 113 Inert Gas Welding .....	1	0	3		2
WELD 114 Introduction to Pipe Welding .....	3	0	12		7
SOC 105 Industrial Economics .....	3	0	0		3
<b>Total</b> .....	<b>9</b>	<b>0</b>	<b>21</b>		<b>17</b>

# WELDING

## Course Descriptions

### WELD 112 MECHANICAL TESTING AND INSPECTION

The standard methods for mechanical testing of welds. The student is introduced to the various types of tests and testing procedures and performs the details of the test which will give adequate information as to the quality of the weld. Types of tests to be covered are: bend, destructive, free-bend, guided-bend, nick-tear, notched-bend, tee-bend, nondestructive, V-notch, Charpy impact, etc.

Prerequisite: WELD III

### WELD 110 HAND AND POWER TOOLS

This course is designed to introduce the student to the correct use of hand tools found in the metals area. Also power tools used in work with metals are demonstrated. Each student will be required to do actual work requiring the use of hand and power tools.

### WELD 120 OXYACETYLENE WELDING, CUTTING THEORY AND PRACTICE

This will be an introduction to the history of oxyacetylene welding; the principles of welding and cutting; the equipment and how to assemble it; lighting and shutting off torch. Welding procedures, such as practice of puddling and carrying the puddle, running flat beads on thin gauge metals, butt welding in flat positions, vertical positions, and overhead positions. Also included will be flame cutting and fillet welding in different positions. There will be additional practice on heavy gauge metals using the different size torches.

### WELD 111 ARC WELDING THEORY AND PRACTICE

This course will be an introduction to arc-welding and will consist of history of arc-welding, principles of arc-welding, arc-welding equipment, safety and practice in the different positions, and various metal alloys.

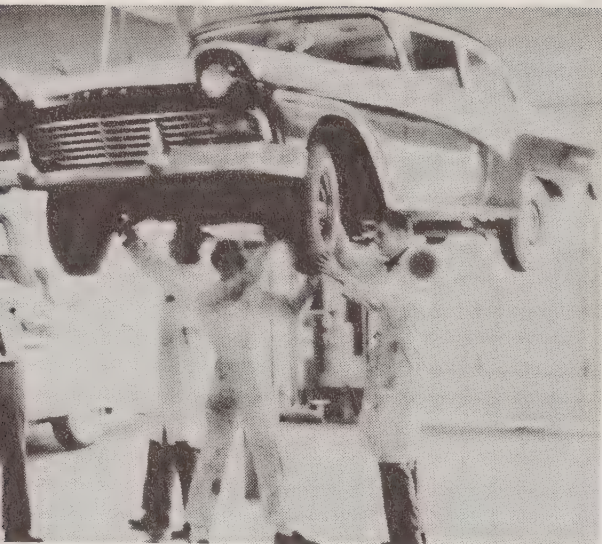
### WELD 113 INERT GAS WELDING

This course will be an introduction to "Heliarc" welding and will consist of the study of equipment, safety practices, different uses of and advantages of this type of welding, and the general practice of inert gas welding.

### WELD 114 INTRODUCTION TO PIPE WELDING

Designed to provide practice in the welding of pressure piping in the horizontal, vertical and horizontal fixed positions using shielded metal arc welding processes.





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## AUTOMOTIVE MECHANICS

This is a one-year program providing a thorough training in the theoretical as well as manual skills in servicing, testing, and diagnosing. All phases of the electrical system, the power plant, the power train, and the hydraulic braking system will be studied.

The courses are arranged in a sequence that gives the student the required technological and special courses as they are needed to coordinate his laboratory experiences.

Emphasis is placed on the mechanical parts and operation of the various automobile units. Trouble shooting and servicing of the live project is also stressed.

## OCCUPATIONAL OPPORTUNITIES

Auto Mechanic, Truck and Bus Mechanic, Shop Foreman, Maintenance Supervisor, Dealer Service Manager, Sales Technician, Factory Representative, and Experimental Lab Work are among those occupational opportunities awaiting graduates of the Automotive Mechanics Curriculum.

Course	Shop				Course	Shop			
	Class	Lab	Prac.	Credit		Class	Lab	Prac.	Credit
<i>First Quarter</i>					<i>Third Quarter</i>				
AUTO 121 Automotive Theory and Practice	3	0	12	7	AUTO 123 Automotive Theory and Practice	3	0	12	7
MATH 121 Mathematics .....	5	0	0	5	AHR 101 Automotive Air Conditioning ....	3	0	0	3
ENG 101 Reading Improvement .....	2	0	0	2	SOC 101 Human Relations .....	2	0	0	2
PHY 104 Applied Physics .....	1	2	0	2	MECH 112 Welding ..	0	0	3	1
	<u>11</u>	<u>2</u>	<u>12</u>	<u>16</u>	PHY 106 Applied Physics .....	1	2	0	2
						<u>9</u>	<u>2</u>	<u>15</u>	<u>15</u>
<i>Second Quarter</i>					<i>Fourth Quarter</i>				
AUTO 122 Automotive Theory and Practice	3	0	12	7	AUTO 124 Automotive Theory and Practice	3	0	9	6
PHY 105 Applied Physics .....	1	2	0	2	SOC 103 Management Procedures .....	3	0	0	3
ENG 102 Communication Skills .....	2	0	0	2	AUTO 125 Automotive Testing and Service	3	0	9	6
DD 121 Blueprint Reading .....	3	0	0	3		<u>9</u>	<u>0</u>	<u>18</u>	<u>15</u>
	<u>9</u>	<u>2</u>	<u>12</u>	<u>14</u>					

# AUTOMOTIVE MECHANICS

## Course Descriptions

### AUTO 121 AUTOMOTIVE THEORY AND PRACTICE—ENGINES

Designed to give the student a thorough knowledge in the use, maintenance, and storage of the various hand tools and measuring devices needed in automotive work. A study of the construction and operation of components of automotive engines. The student will learn testing of engine performance; servicing and maintenance for pistons, valves, cams and camshafts, fuel and exhaust systems, cooling systems; proper lubrication; and methods of testing, diagnosing and repairing of failure and defects in the various engine mechanisms. Prerequisite: None.

### AUTO 122 AUTOMOTIVE THEORY AND PRACTICE—ELECTRICAL AND FUEL SYSTEMS

A thorough study of the electrical and fuel systems of the automobile, the electrical system and its components; battery cranking mechanism, generator, ignition, accessories, and wiring. Intensive training in the components and operation of various types of automotive fuel systems. Characteristics of fuels and types of fuel systems for which they are best adapted. The special tools, circuits, and testing equipment for the fuel and electrical system are studied. Prerequisite: AUTO 121.

### AUTO 123 AUTOMOTIVE THEORY AND PRACTICE—CHASSIS AND SUSPENSIONS

Principles and functions of the components of automotive chassis. Practical job instruction in adjusting and repairing of the suspension, steering and braking systems. Units to be studied will be shock absorbers, springs, steering systems, steering linkage, front end adjustments, types and servicing of brakes, etc. Prerequisites: AUTO 121, 122.

### AHR 101 AUTOMOTIVE AIR CONDITIONING

General introduction to the principles of refrigeration; study of the assembly of the components and connections necessary in the mechanisms, the methods of operation, and control; proper handling of refrigerants in charging the system. Prerequisites: PHY 105, PHY 106.

### AUTO 124 AUTOMOTIVE THEORY AND PRACTICE—POWER TRAIN

Detailed analysis of the components of the automotive power train system, with the emphasis on identification of troubles which develop in these components and the correct servicing and repair. Included are: types of clutches, clutch operation, inspection and servicing clutches; functions of the transmission gears, principles and operation of the various transmission and torque converter types, service and repair; operation, diagnosis and servicing for drive shaft assemblies, rear axles, and differentials. Prerequisites: PHY 105, PHY 106, AUTO 104.

### AUTO 125 AUTOMOTIVE TESTING AND SERVICE

Emphasis is on the shop procedures necessary in determining the nature of troubles developed in the various component systems of the automobile. Extensive use of testing equipment will be made on the actual problem situations. A close simulation to an actual automotive shop will be maintained and every effort will be made to give the student a full range of testing and servicing experience. Prerequisites: AUTO 121, 122, 123, 124.





## AIR CONDITIONING AND REFRIGERATION

The purpose of this curriculum is to provide a broad background of the technical information and skills necessary to the technician in designing, installing, and maintaining refrigeration and conditioning systems.

The curriculum is designed to provide the student with good foundation in the theory and principles of refrigeration and comfort conditioning and at the same time, to give him a chance to experiment and receive practice in installing, maintaining, and repairing refrigeration and conditioning mechanisms and their controls. In the portion of the time devoted to the laboratory, theory and practice are correlated under the laboratory instructor. In addition, instruction is given in the technical fields related to this field.

**State Diploma Awarded**

## OCCUPATIONAL OPPORTUNITIES

Occupational opportunities open to the graduate of this course of study are found most often in the areas of installation, service, inspection, sales, and in the growing fields of truck and trailer refrigeration and automobile air conditioning.

<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Shop</i>	<i>Credit</i>	<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Shop</i>	<i>Credit</i>
<i>First Quarter</i>					<i>Third Quarter</i>				
AHR 121 Elements of Refrigeration ....	5	0	6	7	AHR 123 A. C. and Refrigeration ....	5	0	6	8
ELEC 117 Basic Electricity .....	3	0	0	3	AHR 126 All Year Comfort Systems	3	0	4	5
DD 122 Blueprint Reading .....	5	0	0	5	AHR 128 Automatic Controls .....	2	0	2	3
MA 124 Algebra ..	5	0	0	5	SOC 104 Sales and Communications	2	0	0	2
MECH 112 Welding .....	0	0	3	1					
	<u>18</u>	<u>0</u>	<u>9</u>	<u>21</u>		<u>12</u>	<u>0</u>	<u>12</u>	<u>18</u>
<i>Second Quarter</i>					<i>Fourth Quarter</i>				
AHR 122 A. C. & Refrigeration ....	5	0	6	8	AHR 124 A. C. and Refrigeration ....	3	0	6	6
ELEC 118 Applied Electricity .....	2	0	0	3	AHR 127 All Year Comfort Systems	3	0	2	4
MA 120 Plane Geometry .....	3	0	0	3	MECH 120 Sheet Metal and Duct Fabrica- tion .....	3	0	4	5
AHR 125 Principles of Air Conditioning	5	0	0	5	SOC 103 Manage- ment Procedures	3	0	0	3
DD 126 Applied Drafting .....	1	0	0	2					
	<u>16</u>	<u>0</u>	<u>6</u>	<u>21</u>		<u>12</u>	<u>0</u>	<u>12</u>	<u>18</u>

# AIR CONDITIONING AND REFRIGERATION

## Course Descriptions

### AHR 121 ELEMENTS OF REFRIGERATION

An introduction to the field and terminology of refrigeration. Topics to be included will be the basic laws of refrigeration; heat and the methods of heat transfer; use and care of servicing tools, equipment, tubing, and fittings; compressors; refrigerants and temperature controls; types of refrigerants; special testing and servicing equipment. Shop practice will be given in basic refrigeration and such operations as tube bending, flaring, swaging, soldering, identification and proper use of fittings and basic service testing equipment. Prerequisite: None.

### AHR 122 AIR CONDITIONING AND REFRIGERATION

Discussions, demonstrations and shop practice on residential cabinets using conventional, hermetic and absorption systems. Cabinet care, controls, system maintenance, and system replacement will be stressed. The student will prepare estimates and submit bids on practical projects involving the major types of domestic heating and air conditioning systems. Prerequisite: AHR 121.

### AHR 123 AIR CONDITIONING AND REFRIGERATION

Theory and practice in the installation and service of commercial refrigeration systems. Topics to be studied are the following: Commercial cabinets, walk-in coolers, display cases, frozen food cabinets, condensers, coils, control valves, methods of installation, removal and repair of components, and trouble shooting of systems. The student will prepare estimates and submit bids on practical projects involving the major types of commercial refrigeration systems. Prerequisite: AHR 122.

### AHR 125 PRINCIPLES OF AIR CONDITIONING

Included in this course will be the history, theory, and factors covering air conditioning. Instruction will also include temperature measurement, air movement humidity, psychometric properties, comfort zone, duct systems, air diffusion, air cleaning zone, and testing instruments. Practice in computing system loads, equipment sizing and balancing and the use of charts and tables pertaining to refrigeration equipment. Prerequisite: AHR 121.

### AHR 126 ALL YEAR COMFORT SYSTEMS

The student studies and receives practice in servicing and installing gas burners, electric heating elements and controls. The applications of various heating devices in liquid heating and controls are studied. Basic principles of installing hot water and low pressure boiler controls, pumps, and coils are covered and suitable installations developed. Prerequisites: AHR 122, 125.



## AHR 128 AUTOMATIC CONTROLS

Types of automatic controls and their function in air conditioning systems. Included in the course will be electric and pneumatic controls for domestic and commercial cooling and heating; zone controls; unit heater and ventilator controls; commercial fan system controls; commercial refrigeration controls; and radiant panel controls. Prerequisites: ELEC 118, AHR 122.

## AHR 124 AIR CONDITIONING AND REFRIGERATION

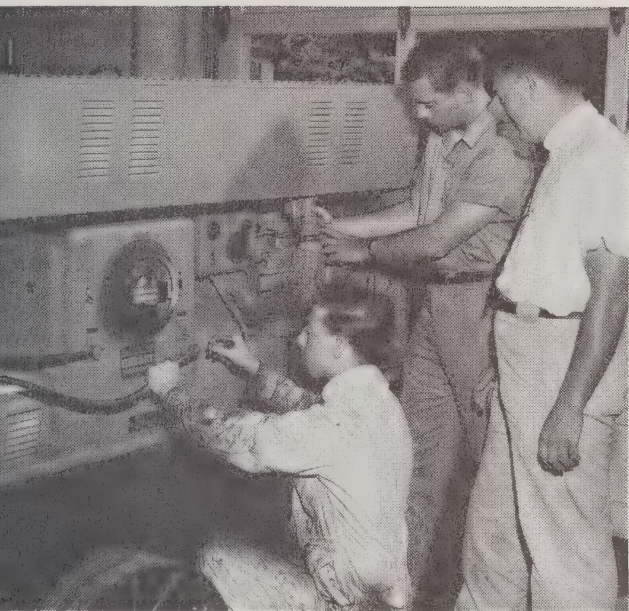
Practice in selecting, installing and servicing of air conditioning systems and accessories. Self contained and remote systems, automotive air conditioning, pumps, wiring, refrigeration piping, air distribution, and comfort zone control, reversing valves, special types of thermostatic expansion valves, systems of de-icing coils are included in this course. Heat pump installations are practiced and emphasis will be placed on correct practices of installation and servicing techniques. Prerequisite: AHR 123.

## AHR 127 ALL YEAR COMFORT SYSTEMS

A continuation of AHR 126 with further study of the servicing and installation of oil fired heating equipment. The various types of burners and their methods of operation, installation, and servicing. Practice will be given in the servicing of this equipment and their control devices. Prerequisite: AHR 126.

## MECH 120 SHEET METAL AND DUCT FABRICATION

Properties of various types of sheet metal will be included in the study of sheet metal fabrication. Safety, sheet metal hand tools, cutting and shaping machines, fasteners and fabrication practices, layout methods and the development of duct systems. The student will lay out, develop, fabricate, and install complete duct systems under practical working conditions. Prerequisite: DD 126, MA 120.



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## HEAVY EQUIPMENT MAINTENANCE

This curriculum is constructed to give each student a foundation in diesel engine and hydraulic systems and go into the areas of electrical, steering, fuel, suspension, cooling, and lubricating. The various types of power trains will be considered.

The area of heavy equipment maintenance offers a wide variety of occupational opportunities. This program will give a student the basic knowledge and the industry will provide the opportunity to apply this knowledge in a specific area of work. Preventative maintenance for all types of heavy equipment will be stressed throughout the entire course. Some knowledge of the operation of heavy equipment will be presented.

### OCCUPATIONAL OPPORTUNITIES

Opportunities in heavy equipment maintenance will be found within Dealerships, Trucking Companies, Public Transportation Companies, General Contractors, Farm Implement Dealers, and industries that maintain heavy equipment.

	<i>Class</i>	<i>Lab</i>	<i>Shop</i>	<i>Total</i>	<i>Credits</i>
<i>First Quarter</i>					
ENG. 101 Reading Improvement .....	2	0	0	2	2
MATH 121 Mathematics .....	5	0	0	5	5
PHYS. 104 Applied Physics .....	1	2	0	3	2
HEV 110 Diesel Engine Theory and Practice .....	3	0	12	15	7
	<hr/> 11	<hr/> 2	<hr/> 12	<hr/> 25	<hr/> 16
<i>Second Quarter</i>					
ENG. 102 Communication Skills .....	2	0	0	2	2
PHYS. 105 Applied Physics .....	1	2	0	3	2
DD 121 Blueprint Reading .....	3	0	0	3	3
HEV 111 Elem. Hydraulic Principles .....	2	3	0	5	3
HEV 112 Heavy Equipment—Theory and Practice (Elec., fuel, and lubricating systems) .....	3	0	12	15	7
	<hr/> 11	<hr/> 5	<hr/> 12	<hr/> 28	<hr/> 17
<i>Third Quarter</i>					
WELD 121 Welding .....	2	0	3	5	3
PHYS. 106 Applied Physics .....	1	2	0	3	2
SOC. 101 Human Relations .....	2	0	0	2	2
HEV 113 Heavy Equip.—Theory and Practice (Hydraulic systems, steering, suspension, braking, cooling systems) .....	3	0	12	15	7
	<hr/> 8	<hr/> 2	<hr/> 15	<hr/> 25	<hr/> 14
<i>Fourth Quarter</i>					
SOC. 103 Management Procedures .....	3	0	0	3	3
HEV 114 Heavy Equipment—Theory and Practice (Power train systems) .....	3	0	6	9	5
HEV 115 Heavy Equipment Service and Repairs .....	3	0	12	15	7
	<hr/> 9	<hr/> 0	<hr/> 18	<hr/> 27	<hr/> 15



# HEAVY EQUIPMENT MAINTENANCE

## Course Description

### HEV 110 DIESEL ENGINE THEORY AND PRACTICE

This course is designed as an introduction to the most common types of diesel engines. Each student will be subjected to the principles and theory of the diesel engine and required to work with several different types of engines. As the engines are rebuilt the proper use of hand tools and instruments will be taught. Standard procedures will be used in all engine work. Methods of checking the various parts of the engines will be employed.

### HEV 111 ELEMENTARY HYDRAULIC PRINCIPLES

Students will be introduced to the principles of hydraulic systems as they apply in the heavy equipment area. The theory of hydraulic systems must be understood thoroughly before the students can progress into actual work on hydraulic systems. Various aspects of heavy equipment will be used to demonstrate these principles and theories.

### HEV 112 HEAVY EQUIPMENT THEORY AND PRACTICE

This course continues from the engine course and will subject the student to the electrical system, fuel system, and lubricating systems. Each area will be treated as an individual unit. Each student will compare the various systems of Heavy Equipment. Preventive maintenance will be stressed in all areas. Types of fuel and the importance of pure and clean fuel will be taught. Tools, instruments, and machines related to these units will be presented.

### HEV 113 HEAVY EQUIPMENT THEORY AND PRACTICE

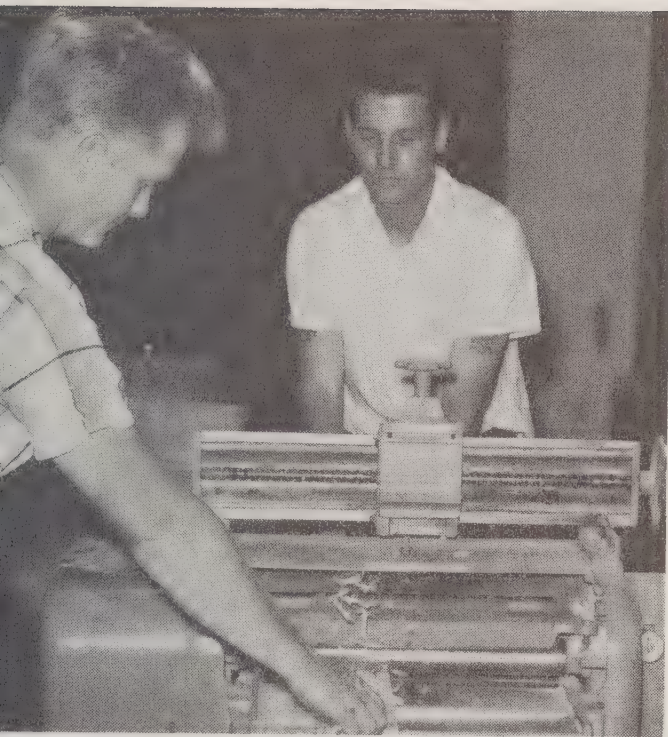
This course continues from the engine course and will advance the student into the actual hydraulic systems, steering, suspension, braking, and cooling systems. Each subject area will be treated as an individual unit taught separately. Each student will be required to study the difference in system on various pieces of equipment. Tools, machines, and instruments used in the various aspects of this work will be presented.

### HEV 114 HEAVY EQUIPMENT THEORY AND PRACTICE

This course is designed to go into all types of power trains in heavy equipment. A study of the theory of power trains will be presented and applications of maintenance and repair will give each student an opportunity to review various types of power trains. Actual experience in the operation of power trains will be required to give each student an overview of a variety of experiences. Special tools and instruments used in maintenance and repair of power trains will be presented.

### HEV 115 HEAVY EQUIPMENT SERVICE AND REPAIRS

This course is constructed to require students to utilize all tools, instruments, and machines for analysis of all aspects of service and repair. The procedures employed in service and repair will be the same as expected in the industry. Each student will be expected to show individual ability and initiative in determining the troubled area of heavy equipment.



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## CARPENTRY AND CABINET MAKING

This curriculum is designed to subject a student to the fundamentals of carpentry work and the basic procedures of cabinet making. Students will begin with hand tools and progress into the woodworking machines found in a cabinet shop. The carpentry work will begin with the masonry foundation and progress to the finished building. Some consideration will be given to industrial buildings as compared to residential buildings.

Each student will have an opportunity to review the work of other skilled tradesmen such as plumbing and heating, electrical, masonry, and painting and finishing.

With the tremendous population growth and expanding industry this area will serve a need that has unlimited potential.

## OCCUPATIONAL OPPORTUNITIES

Occupational opportunities will be found with private builders, residential builders, general contractors, cabinet shops, and in many industries that maintain their own building.

<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Shop</i>	<i>Credit</i>	<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Shop</i>	<i>Credit</i>
<i>First Quarter</i>					<i>Third Quarter</i>				
DD 121 Blueprint Reading .....	3	0	0	3	DD 127 General Drafting .....	2	3	0	3
MA 121 Mathematics (Review) .....	5	0	0	5	MA 123 Mathematics (Trig.) .....	5	0	0	5
ENG 101 Reading Improvement ....	2	0	0	2	CAR 114 Plumbing .....	2	0	3	3
CAR 110 Cabinet-making I .....	5	0	10	8	CAR 115 Cabinet-making III .....	3	5	0	4
Totals .....	15	0	10	18	CAR 116 Carpentry II ....	3	0	4	4
<i>Second Quarter</i>					Totals .....	15	8	7	19
DD 122 Blueprint Reading .....	3	2	0	4	<i>Fourth Quarter</i>				
MA 120 Mathematics (Geometry) .....	3	0	0	3	CAR 117 Materials and Finishes ....	2	0	3	3
CAR 111 Masonry .....	3	0	5	4	CAR 118 Cabinet-making IV .....	2	0	6	4
CAR 112 Cabinet-making II .....	3	0	6	5	CAR 119 Carpentry III ....	4	0	11	7
CAR 113 Carpentry I .....	2	0	3	3	SOC 101 Human Relations .....	2	0	0	2
Totals .....	14	2	14	19	Totals .....	10	0	20	16



## CAR 110 CABINETMAKING I

This course is designed to introduce the student to hand tools used in a cabinet shop. After several projects with hand tools the student will be placed on each machine. Various types of wood will be used and identification of the various types of wood will be required.

## CAR 111 MASONRY

The student will study the various types of masonry construction and the types of masonry materials on the market today. Framing for chimney construction, ceramic floors and walls, flues will be presented. Form work for concrete walls, pillars, floors, foundations, driveways, and patios will be practiced. A study of the various mixtures of concrete and mortar mix will be studied.

## CAR 112 CABINETMAKING II

This course will go into the necessary framing for cabinet work. Students will be presented a study of built in cabinets and pre-constructed cabinet work. Built in book cases and special work will be presented.

## CAR 113 CARPENTRY I

This course will be presented as an introduction to the first steps necessary from the finished foundation to the complete framing of a building. Methods of framing entire walls before erection will be presented. Motion saving methods and overall planning of time will be presented. Size of nails and identification of nails will be studied.

## CAR 114 PLUMBING AND HEATING SYSTEMS

This particular course is designed to help the carpenter understand the types of plumbing and heating systems that are used in modern building construction. The requirements to special framing on the part of the carpenter will be practiced.

## CAR 115 CABINETMAKING III

This course will progress into the various woods used in cabinetmaking. Drawers, doors, hardware, and cornice work will be practiced. Methods of finishing and types of finishes will be studied.

## CAR 116 CARPENTRY II

In this course the students will study all types of roof construction. Each student will be required to cut and assemble all type of rafters. Students will be required to put on all types of shingles and prepare a roof for "built up construction". The students will also be required to study the framing square in order to figure the length of rafters and other materials.

## CAR 117 MATERIALS AND FINISHES

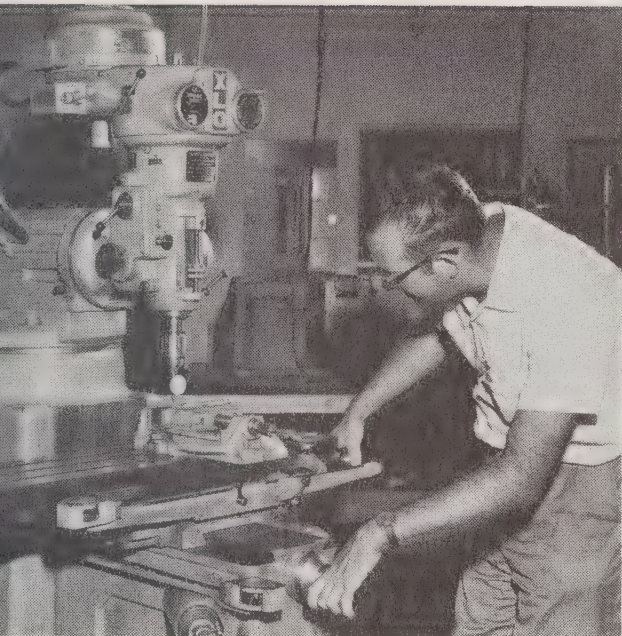
This course will present an identification and selection of materials. Methods and types of external finishes will be presented. Types of doors, windows, and external siding will be presented. Each student will be required to frame, stop and lock, doors and windows.

## CAR 118 CABINETMAKING IV

This is a study of the type of materials used on tops and other finished areas. Each student will study built in appliances such as stoves, ovens, dishwashers, and refrigerators. Finished cornice and standard measurements of all cabinet work will be presented.

## CAR 119 CARPENTRY III

This course will present the student with the finish work of carpentry. Types of baseboard, moulding, door facing, and framing and finishing stair cases will be presented. Each student will be subjected to a series of projects under close supervision that will require use of all finishing tools normally used by a carpenter. Clean work and self pride will have an emphasis in this course.



**State Diploma Awarded**

## TOOL AND DIE MAKING

The Tool and Die maker is the foundation man of many industries. This individual is highly skilled and possesses a tremendous depth of technical knowledge. This curriculum is designed to start an advanced machinist into the elementary requirement of tool and die making and progress into more complex dies, jigs and fixtures, gauges, and other areas.

This course will enable the advanced machinist to compare the machines found in a tool and die shop with those found in an average machine shop. Each student will be required to become highly proficient in the use of each machine used in Tool and Die Making. The related courses are designed to give the student an opportunity to advance his knowledge in mathematics, strength of materials, drafting, and hydraulics and pneumatics.

## OCCUPATIONAL OPPORTUNITIES

Occupational opportunities are found in metal working industries, government installations, machine shops, maintenance shops, and a wide variety of other industries that have repetitive production of products.

<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Shop</i>	<i>Credit</i>	<i>Course Title</i>	<i>Class</i>	<i>Lab</i>	<i>Shop</i>	<i>Credit</i>
<i>Fifth Quarter</i>					<i>Seventh Quarter</i>				
MECH 210 Machine Processes .....	3	0	12	7	MECH 212 Machine Processes .....	3	0	12	7
MA 203 Trigonometry .....	3	0	0	3	MECH 205 Strength of Materials .....	5	0	0	5
DD 227 Drafting..	3	6	0	5	DD 211 Mechanisms .....	5	0	0	5
Totals .....	9	6	12	15	PHY 205 Hydraulics and Pneumatics	3	0	0	3
<i>Sixth Quarter</i>					Totals .....	16	0	12	21
MECH 211 Machine Processes .....	3	0	12	7	<i>Eighth Quarter</i>				
MECH 204 Metallurgy .....	3	6	0	6	MECH 213 Machine Processes .....	3	0	12	7
DD 224 Advanced Blueprint Reading ....	3	0	0	3	DD 212 Tool Design .....	2	6	0	4
MA 204 Compound Angles and Curves .....	3	0	0	3	MECH 214 Special Problems .....	0	0	6	2
Totals .....	12	6	12	19	Totals .....	5	6	18	13



# TOOL & DIE MAKING

## Course Description

### MECH 210 MACHINE PROCESSES

This course is designed to introduce the student to the tools, instruments, and machines used in the tool and die shop. The student will compare the machines used in production with those used in tool and die making. The student will become familiar with jigs and fixtures and their applications pertaining to production machining. Each student will be subjected to a series of projects that will require extreme proficiency.

### MA 203 TRIGONOMETRY

A basic review of mathematics will form a foundation for a study of trigonometry of right triangles, vectors, coordinate systems, logarithmic and dimensional analysis. Applications to typical problems found in the tool and die shop will be presented and solutions will be found by using mathematics.

### DD 227 DRAFTING

An introductory course in drafting for students needing a knowledge of drawing principles and practices for reading and describing objects in the graphic language. The student is expected to gain basic skills in drawing with instruments, geometrical construction, freehand sketching, and describing objects orthographically with principal views and sections.

### MECH 211 MACHINE PROCESSES

Advanced operations of the tool and die shop, utilizing all machines. A study of shearing, punching, forming, and drawing dies will be presented. The student will receive instructions on gauging practices and its application to the finished product, and will become familiar with various types of gauging procedures. Each student will work individually on a series of projects, gaining proficiency and knowledge of the various types of tools and dies found in industry.

### MECH 204 METALLURGY

Properties of metals and various methods of changing these properties, classification of metals, powder metallurgy, and factors contributing to production and selection of metals will be presented. Chemical finishes, electroplating, and other methods of finishing or treating metals will be areas of study.

### DD 244 ADVANCED BLUEPRINT READING

A complete and thorough knowledge of tool and die prints will be required of all students. Industrial prints will be used in this course. The difference between production drawings or operation sheets and tools drawing will be presented. Assembly drawings as the piece fits into place will be broken down into each detail print required.

### MA 204 COMPOUND ANGLES AND CURVES

The application of trigonometry and geometry will be presented to solve compound angles. This course will use as many practical problems as possible to enable the student to work with typical problems in compound angles and curves without points of generation.

## **MECH 212 MACHINE PROCESSES**

This course will present a study of progressive dies typical of the operations found in the average industry. Step by step tooling used to transform raw material into a finished working part will be studied. Total utilization of all machines and instruments will be required. Application of hydraulic systems, air operated systems, pneumatic systems, and electronic controls and cycle devices will be presented. Emphasis will be placed on proper holding locations for machining and gauging finished parts.

## **MECH 205 STRENGTH OF MATERIALS**

A study of stresses and shears that occur in materials when subjected to tensile, compressive, and/or shearing forces. Stresses in thin walled cylinders, riveted and welded joints, shear and bending moment diagrams, deflection, eccentrically applied loads, torsion, and factors of column design will be emphasized.

## **DD 211 MECHANISMS**

This course consists of an application of mathematics and drafting room procedures to the solution of problems involving the principles of machine elements. A study of motions of linkages, velocities, and acceleration of points within a link mechanism, and layout methods for designing cams, belting, pulleys, gear and gear trains will be presented.

## **PHY 205 HYDRAULICS AND PNEUMATICS**

A basic theory of hydraulics and pneumatics systems and their combinations in various circuits. Function and basic design of circuits and motors, controls, electrohydraulic servo elements, synchro elements, and air operated systems will be presented. Automated systems of productions utilizing dies, tools, gauges, jigs and fixtures will be considered.

## **MECH 213 MACHINE PROCESSES**

This course will be used to review various processes of tool and die work, jigs and fixtures and gauging. Consideration of the production desired will be used to select the proper systems. Each student will work individually on different processes or systems utilizing all machines, instruments, and tools in tool and die making.

## **DD 212 TOOL DESIGN**

This course will enable the student to plan the process of production and isolate the areas that must be tooled for production. Cost of tools, die work, jig and fixtures, and gauging will be considered. Students will review available items from vendors and utilize standard bushing charts and other references. Typical tool design procedures will be employed and prints must reflect standard procedures.

## **MECH 214 SPECIAL PROBLEMS**

This course will be used to subject the student to special problems within local industries. Numerous field trips will be scheduled for individual and groups to review installation of systems, development of dies, tools, jigs and fixtures, and gauging. Each student will be required to follow one complete system from the design stage through to production. Special procedures of die casting, sand casting, shell molding, injection molding, hydro forming, and others will be presented.





## PRACTICAL NURSE EDUCATION INTRODUCTION

The accelerated growth of population in North Carolina and rapid advancement in medical technology demand an increased number of well-trained personnel for health services. Realizing this need, the State Department of Community Colleges, in conjunction with local hospitals, administrators programs of practical nurse education in local school systems, community colleges, technical institutes and in industrial education centers throughout the state.

### State Diploma Awarded

The aim of the Practical Nurse Education Program is to make available to qualified persons the opportunity to prepare for participation in care of patients of all ages, in various states of dependency, and with a variety of illness conditions.

Students are selected on the basis of demonstrated aptitude for nursing as determined by pre-entrance tests, interviews with faculty members, high school record, character references, and reports of medical and dental examination.

Throughout the one-year program the student is expected to grow continuously in acquisition of knowledge and understandings related to nursing, the biological sciences, the social sciences and in skills related to nursing practice, communications, interpersonal relations, and use of good judgment. Evaluation of student performance consists of tests on all phases of course content, evaluation of clinical performance, and evaluation of adjustment to the responsibilities of nursing. A passing score is required on all graded work, plus demonstrated progress in application of nursing skills to actual patient care.

Graduates of accredited programs of practical nurse education are eligible to take the licensing examination given by the North Carolina Board of Nursing. This examination is given twice each year, usually in April and September. A passing score entitles the individual to receive a license and to use a legal title "Licensed Practical Nurse." The license must be renewed annually. The Licensed Practical Nurse can apply for licensure in other states on the basis of a satisfactory examination score, without repeating the examination.

### OCCUPATIONAL OPPORTUNITIES

The LPN is prepared to function in a variety of situations: hospitals of all types, nursing homes, clinics, doctor's and dentists' offices and, in some localities, public health facilities. In all situations the LPN functions under supervision of a registered nurse and/or licensed physician. This supervision may be minimal in situations where the patient's condition is stable and not complex; or it may consist of continuous direction in situations requiring the knowledge and skills of the registered nurse or physician. In the latter situation, the LPN may function in an assisting role in order to avoid assuming responsibility beyond that for which the one-year program can prepare the individual.

Job requirements for the Licensed Practical Nurse include suitable personal characteristics, ability to adapt knowledge and understandings of nursing principles to a variety of situations, technical skills for performance of bedside nursing, appreciation for differences of people and for the worth of every individual, a desire to serve and help others, and readiness to conform to the requirements of nursing ethics and hospital policies.

# PRACTICAL NURSE EDUCATION

	<i>Class</i>	<i>Lab.</i>	<i>Clinic</i>	<i>Quarter Hours Credit</i>
<i>First Quarter</i>				
Practical Nursing I .....	18	2	3	20
<i>Second Quarter</i>				
Practical Nursing II .....	12	2	21	20
<i>Third Quarter</i>				
Practical Nursing III .....	10	2	24	19
<i>Fourth Quarter</i>				
Practical Nursing IV .....	10	2	24	19
Totals .....				<u>78</u>

# PRACTICAL NURSE EDUCATION

# PRACTICAL NURSING I

## COURSE DESCRIPTIONS

**COURSE MATERIAL:**

- Nursing—History
  - Introduction to patient care
- Health—Personal, physical and mental
  - Family
  - Community
- Basic Science—Body structure and function
  - Bacteriology
  - Basic nutrition
- Vocational Adjustments—Introduction to ethics and legal aspects of nursing
- Communications and Human Relations

**Classroom activities** are planned to assist students in development of knowledge, understanding, appreciations, and attitudes basic to effective nursing of patients of all ages and backgrounds with nursing needs arising both from the individuality of the patient and from inability for self-care as a result of a health deviation. The student is encouraged to develop beginning skills in analysis of patient needs, both through classroom study of hypothetical patient situations and through planned patient experiences in the clinical environment. Beginning skills in nursing methods are developed through planned laboratory experiences, followed by related practice in actual patient care.

**Clinical activities** provide introduction to actual patient care through selected clinical assignments requiring application of current classroom and laboratory learnings.

**PREREQUISITE:** Admission requirements.



## PRACTICAL NURSING II

**COURSE MATERIAL:** Medical-Surgical Nursing—Patients care  
Therapeutic Methods,  
including administration of oral medication.

Introduction to Maternity Nursing

Introduction to Nursing the Sick Child

Communications and Human Relations

**Classroom activities** center around analysis of nursing needs as viewed in perspective with the needs arising from the individuality of the patient and from the illness condition. Related information is presented as it is levelant to the student's understanding of and ability to meet nursing needs of patients.

**Clinical activities** provide selected experiences in patient care in order for the student to develop skill in applying classroom learnings to a variety of patient situations.

**PREREQUISITE:** Practical Nursing I.

## PRACTICAL NURSING III

**COURSE MATERIAL:** Common Medical-Surgical Conditions

Care of the Subacutely Ill Child

Care of Maternity Patient and Newborn Infant  
With Complications

**Classroom activities** center around analysis of nursing needs arising from the specific illness condition and the medical plan.

**Clinical activities** consist of guided experiences in nursing patients with conditions which illustrate classroom learnings.

**PREREQUISITE:** Practical Nursing II.

## PRACTICAL NURSING IV

**COURSE MATERIAL:** Needs of the Seriously Ill Patient

Needs of Patients in Immediate Post-Operative  
Period

Needs of Labor Patient

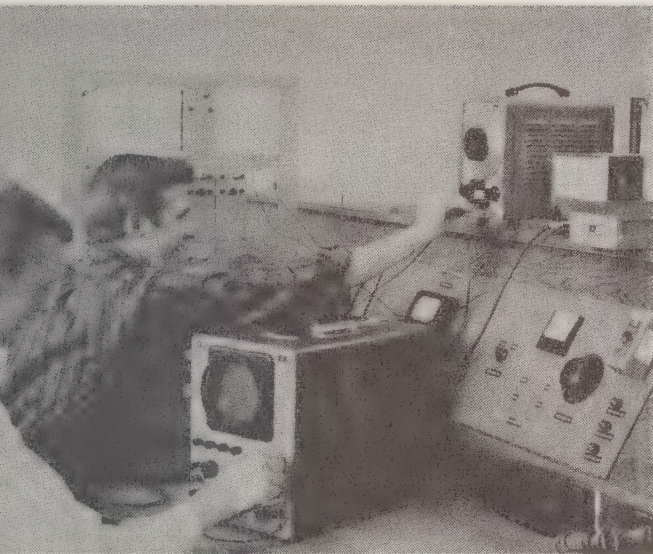
Needs of the Seriously Ill Child

Assuming the Role of Graduate Practical Nurse

**Classroom activities** center around the needs of seriously ill patients of all ages, of labor patients, and of patients immediately following surgery.

**Clinical activities** consist of guided experiences in the care of seriously ill patients, labor patients, and surgery patients, and is planned to parallel classroom learnings whenever possible.

**PREREQUISITE:** Practical Nursing III.



# RADIO AND TELEVISION SERVICING

This curriculum is designed to fill the tremendous need for radio and television repairmen. With the number of televisions increasing every year, the need for individuals to service and install these receivers is also increasing every year. This particular curriculum will start with the basic information as a foundation on which the advance courses are established. The individuals enrolled in the school of radio and television repair will spend over half of their time in the laboratory with typical servicing and installation problems found in the field of work.

## OCCUPATIONAL OPPORTUNITIES

Radio Serviceman, Television Serviceman, Radio and Television Salesman, Installation, and Manufacturer Representative.

Course	Shop				Course	Shop			
	Class	Lab	Prac.	Credit		Class	Lab	Prac.	Credit
<i>First Quarter</i>					<i>Third Quarter</i>				
Ma 125 Electrical Math .....	5	0	0	5	Eln 124 Vacuum Tubes and Circuits .....	4	4	0	6
Elec 122 Direct and Alternating Current .....	7	8	3	12	Eln 125 Radio Receiver Servicing ....	2	0	6	4
Eng 101 Reading Improvement .....	2	0	0	2	Eln 126 Transistor Theory and Circuits .....	5	4	0	7
	14	8	3	19	Soc 103 Management Procedures .....	3	0	0	3
						14	8	6	20
<i>Second Quarter</i>					<i>Fourth Quarter</i>				
EIn 122 Vacuum Tubes and Circuits .....	5	10	0	10	Eln 127 Television Receiver Circuits and Servicing .....	10	0	15	15
Eln 123 Amplifier Systems .....	2	0	6	4	or				
Eng 102 Communication Skills .....	2	0	0	2	Eln 128 Television Receiver Circuits and Servicing .....	5	0	12	9
Soc 101 Human Relations .....	2	0	0	2	Elective (1) .....	5	0	6	7
	11	10	6	18		10	0	18	16
<b>ELECTIVE</b>									
ELN 129 Single Side Band Systems .....						5	0	6	7
ELN 130 Two-way Mobile Maintenance .....						5	0	6	7



# **RADIO AND TELEVISION SERVICING**

## **Course Descriptions**

### **ELEC 122 DIRECT AND ALTERNATING CURRENT**

A study of the structure of matter and the electron theory, the relationship between voltage, current and resistance in series, parallel and series-parallel circuits. Analysis of direct current by Ohm's law and Kirchhoff's law; sources of direct current potentials. Fundamental concepts of alternating current flow; a study of reactance, impedance, phase angle, power and resonance and alternating current circuit analysis.

Prerequisite: None.

### **ELN 122 VACUUM TUBES AND CIRCUITS**

An introduction to vacuum tubes and their development; the theory, characteristics and operation of vacuum diodes, semi-conductor diodes, rectifier circuits, filter circuits, triodes and simple voltage amplifier circuits.

### **ELN 123 AMPLIFIER SYSTEMS**

An introduction of commonly used servicing techniques as applied to monophonic and stereophonic high fidelity amplifier systems and auxiliary equipment. The operation and servicing of intercommunication amplifiers and switching circuits will also be taught.

### **ELN 124 VACUUM TUBES AND CIRCUITS**

A continuing study of tubes and circuits; the theory, characteristics, and operation of the tetrode and pentode tubes, voltage and power amplifiers, tunable RF amplifiers, oscillators and demodulator circuits.

### **ELN 125 RADIO RECEIVER SERVICING**

Principles of radio reception and practices of servicing; included are block diagrams of radio receivers, servicing techniques of AM and FM receivers by resistance measurements, signal injection, voltage analysis, oscilloscope methods of locating faulty stages and components, and the alignment of AM and FM receivers.

### **ELN 126 TRANSISTOR THEORY AND CIRCUITS**

Transistor theory, operation, characteristics and their application to audio and radio frequency amplifier and oscillator circuits.

### **ELN 127 TELEVISION RECEIVER CIRCUITS**

A study of principles of television receivers, alignment of radio and intermediate frequency amplifiers, adjustment of horizontal and vertical sweep circuits will be taught. Techniques of trouble shooting and repair of TV receivers with the proper use of associated test equipment will be stressed. Additional study of more specialized servicing techniques and oscilloscope waveform analysis will be used in the adjustment, trouble-shooting and repair of the color television circuits.

### **ELN 128 TELEVISION RECEIVER CIRCUITS**

This course, taught in conjunction with an elective will be a shortened version of ELN 127.

### **ELN 129 SINGLE SIDE-BAND SYSTEMS**

An introductory course of single side-band transmission system with carrier frequency or without and the associated balanced modulator or phasing system used to produce this type of transmission. Time will be allotted also to the necessary circuitry in the receiver to receive this type transmission.

### **ELN 130 TWO WAY MOBILE MAINTENANCE**

A course to acquaint the student with the theory and maintenance of fixed station and mobile station transmitters and receivers. Except for radio laws, sufficient information will be given to qualify the student to take the FCC second class radiotelephone license examination.

## RELATED COURSES

### Course Descriptions

#### DD 126 APPLIED DRAFTING

A specialized course in drafting for the heating, air conditioning and refrigeration student. Emphasis will be placed on reading of blue prints that are common to the trade; blueprints of mechanical component; assembly drawings; wiring diagrams and schematics; floor plans and heating system plans including ducts, equipment layout plans, and shop sketches. The student will make tracings of floor plans and layout heating systems. Prerequisite: DD 122.

#### DD 305 DESIGN DRAFTING I

Basic design is introduced in the study of motion transfer mechanisms as they relate to power trains. Principles of design sketching, design drawing, layout drafting, detailing from layouts, production drawings, and simplified drafting practices constitute areas of study. Types and methods of specifying materials and workmanship are an integral part of the course.

#### DD 306 DESIGN DRAFTING II

Research to solve a problem in design by consulting various manuals, periodicals, and through laboratory experiments. A written technical report, preliminary design sketches, layout drawings, detail drawings, assembly and sub-assembly drawings, pictorial drawings, exploded pictorial assembly, patent drawings, and specifications are required as a part of the problem.

#### DD 307 GENERAL DRAFTING

An introductory course in drafting for students needing a knowledge of drawing principles and practices for reading and describing objects in the graphic language. The student is expected to gain basic skills in drawing with instruments, lettering, geometrical constructions, freehand sketching, and describing objects orthographically with principal views. Freehand sketching and orthographic reading are to be emphasized.

#### DD 308 GENERAL DRAFTING

The student continues the study of orthographic projection with applications to orthographic instrument drawing. Dimensioning procedures and practices are emphasized and the student is introduced to the "working drawing." Methods of describing complex objects with auxiliary views and/or sections and conventions are taught.

#### DD 309 PLANT LAYOUT

A practical study of factory planning with emphasis on the most efficient arrangements of work areas to achieve lower manufacturing costs. It includes the study of sample layouts for small and medium-sized plants, layout fundamentals, selection of production equipment, materials, handling equipment, and the effective management of men, money, and materials in a manufacturing operation.

#### DD 311 MECHANISMS

This course consists of mathematical and drafting room solutions of problems involving the principal machine elements. Included is a study of motions of linkages, velocities, and acceleration of points within a link mechanism, and layout methods for designing cams, belting, pulleys, gears and gear trains.



## DD 312 DESCRIPTIVE GEOMETRY

This is a study of the graphical analysis of space problems. The problems deal with practical design elements involving points, lines, planes, connectors, and a combination of these. Also included are problems dealing with solid geometry theorems. Where applicable, each graphical solution shall be accompanied by the analytical solution and visualization shall be stressed on every problem.

## ELN 301 INDUSTRIAL CONTROLS

Industrial controls is the study of modern methods of controlling machinery by electronic circuitry. Machinery controls and electronic mechanisms that automatically operate machines will be studied. Types of motors, generators, control signals and devices, thyratrons, gates, switches, and servomechanism circuits are major areas of study.

## ENG 101 READING IMPROVEMENT

A concentrated effort to improve the student's ability to comprehend what he reads by training him to read more rapidly and accurately. The tachistoscope is used for class drill to broaden the span of recognition, to increase eye coordination and word group recognition, and to train for comprehension in larger units. Reading faults of the individual are analyzed for improvement, and principles of vocabulary building are stressed.

## ENG 102 COMMUNICATION SKILLS

Development of the trainee's ability to communicate effectively with other individuals through the medium of good language usage in speaking and writing, to think more clearly, and to reason more forcefully in work problems pertaining to his job.

## ENG 301 READING IMPROVEMENT

A concentrated effort to improve the student's ability to comprehend what he reads by training him to read more rapidly and accurately. The tachistoscope is used for class drill to broaden the span of recognition, to increase eye coordination and word group recognition, and to train for comprehension in larger units. Reading faults of the individual are analyzed for improvement, and principles of vocabulary building are stressed. Prerequisite: None.

## ENG 302 COMMUNICATIVE SKILLS: ENGLISH

Designed to aid the student in the improvement of self-expression in both business and technical compositions. The approach is functional with emphasis on grammar, diction, sentence structure, punctuation, and spelling. Intended to stimulate students in applying the basic principles of English grammar in their day-to-day situations in industry and social life.

## ENG 303 COMMUNICATIVE SKILLS: TECHNICAL WRITING

The basic fundamentals of English are utilized as a background for the organization and techniques of modern technical writing. Exercises in developing typical technical reports, using writing techniques and graphic devices, are completed by the students. Practical application in the preparation of a full-length technical report is required of each student at the end of the term.

## ENG 304 COMMUNICATIVE SKILLS

Technical speech is to develop the speaking skills with emphasis upon the dual role of communications as both a speaking and listening skill. Stress is also placed upon the growth in poise and confidence on the part of the student. Practice is provided through individual speeches and group discussion. Recordings are made of the student's voice and used as an aid in speech development. Prerequisite: ENG 302.

## ISc 102 INDUSTRIAL ORGANIZATIONS

Methods, techniques, and practices of modern management in planning, organizing, and controlling operations of a manufacturing concern. Introduction to the competitive system and the factors constituting product cost. Prerequisite: None.

## ISc 301 INDUSTRIAL ORGANIZATION AND MANAGEMENT

Study of organizational structure, operational and financial activities, including accounting, budgeting, banking, credit and industrial risk, forecasting of markets, selection and layout of physical facilities; selection, training and supervision of personnel as found in typical industrial organizations.

## ISc 302 QUALITY CONTROL

The broad viewpoint of the subject is covered including basic principles and techniques used to effect better control, cost saving, and an efficient quality control department. Specific subjects considered include the functions, responsibilities, structure, costs, reports, records, personnel and vendor-customer relationships of the quality control department and the principles used in sampling inspection, process control and tests for significance. Practical methods for application are stressed.

## ISc 303 MOTION STUDY

A course designed to prepare the student for solving the ever-increasing need of greater labor productivity in industry. Types of methods studies and the application of each are explored. Included is a study of process charts, analysis sheets, and the systematic consideration of the factor of production in sequence. The various uses of time study in a manufacturing plant, the qualifications of a time study man, the principles of work simplification, skill and effort rating, and standard data are studied and applied.

## ELEC 122 DIRECT AND ALTERNATING CURRENT

A study of the electrical structure of matter and the electron theory, the relationship between voltage, current and resistance in series, parallel and series-parallel circuits. Time will be devoted to the analysis of direct current circuits by Ohm's law and Kirchhoff's law; time will be allotted for the study of sources of direct current potentials. Fundamentals concepts of alternating current flow; a study of reactance, impedance, phase angle, power and resonance. Time will be allotted for alternating current circuit analysis.

## ELEC 118 APPLIED ELECTRICITY

The use and care of electrical test instruments and equipment used in the servicing of refrigeration electrical apparatus. Meter principles and procedures of trouble shooting of the various electrical devices used in air conditioning, heating, and refrigeration equipment. Included will be transformers, motors, starting devices, switches, electrical heating devices, and wiring. Prerequisite: ELEC 117.



### **ELEC 117 BASIC ELECTRICITY**

A study of the basic theories of electricity, types of electricity, methods of production, and the transmission and transforming of electricity. The course will include the following topics: Electron theory; electricity by chemical action, friction and magnetism; induction, voltage, horsepower, amperage, wattage, transformers, wiring and resistance. Prerequisite: None.

### **ELEC 301 ELECTRICAL MACHINERY**

A course in the basic understanding and application of electricity to modern industrial machinery. Included is a study of DC motors, motor controls and protecting devices, transformers, and the industrial applications of this equipment.

### **ELEC 309 ELECTRICAL FUNDAMENTALS**

This course will introduce the student to direct current theory and circuits as an aid to programming data processing equipment. An introduction to simple alternating current circuits will also be given. Prerequisite: None.

### **DD 121 BLUEPRINT READING**

Interpretation and reading of blueprints used by industry. A course designed to develop the ability to read and interpret blueprints, charts, instruction and service manuals, and wiring diagrams. Information on the basic principles of lines, views, dimensioning procedures, and notes. Prerequisite: None.

### **DD 122 BLUEPRINT READING**

Interpretation and reading of blueprints used by industry. Information on the basic principles of the blueprint; lines, views, dimensioning procedures and notes. Prerequisite: None.

### **DD 123 BLUEPRINT READING**

Further practice in interpretation of blueprints as they are used in industry; study of prints supplied by industry; making plans of operations; introduction to drafting room procedures; sketching as a means of passing on ideas, information, and processes. Prerequisite: DD 122.

### **SOC 101 HUMAN RELATIONS**

The purpose of the course is to help the student acquire greater understanding of his relations to other persons through learning and applying some of the basic principles of human psychology. The problems of the individual and his work situation are studied in relation to the established organization of modern business and industry and in relation to government practices and labor organization, with special emphasis on the operating responsibilities of good management.

### **SOC 103 MANAGEMENT PROCEDURES**

Management procedures are developed to familiarize the prospective businessman with the many important functions that must be carried on in the operation of a small business or enterprise. An introduction to the business world, problems of small business operation, basic business law, business forms and records, financial problems, ordering and inventorying, layout of equipment and offices, methods of improving business, and employer-employee relations are some of the subjects studied.

### **SOC 301 HUMAN RELATIONS**

Principles of inter-personal relations including a consideration of motivation, feelings, emotions, and learning with reference to their applications to on-the-job situations; personal and group dynamics and self-adjustment.

## SOC 302 ECONOMICS

The fundamental principles of economics including institutions and practices by which people gain a livelihood. Included is a study of the laws of supply and demand and the principles bearing upon production, exchange, distribution, and consumption both in relation to the individual enterprise and to society at large.

## SOC 104 SALES AND COMMUNICATION

A course to improve the serviceman's ability to communicate more effectively. Instruction will be given in preparing reports, communication principles, and salesmanship. Prerequisite: None.

## MA 120 PLANE GEOMETRY

The student will be given the patterns of traditional geometric concepts in a new approach by developing the normally innate abilities of the individual to visualize spatial problems. This course will include the following: Principles of plane geometry, plane geometric figures, general theorems, pythagorean theorem, the circle, geometric construction, area of plane figures, volume of solids, and geometric principles applied to shop operations. Prerequisite: None.

## MATH 121 MATHEMATICS

Review of fundamental number concepts, operations, and systems of measurement. Mathematical situations dealing with common and decimal fractions, powers and roots, ratio and proportions, and percentages. A study of algebraic and geometric principles and concepts needed in understanding calculations, formulas, solution of equations, and selected plane and solid geometric forms. Prerequisite: None.

## MATH 122 MATHEMATICS

Foundation for a better understanding of applied mathematics. This course is a review of simple mathematical situations dealing with fractions, decimals, conversion of one to the other, short methods and checks, percentages and applications, ratio and proportion, and powers and roots. It will also present an introduction to axiomatic solution of equations and includes special products and factoring, algebraic fractions and their applications to equations. Prerequisite: None.

## MATH 123 MATHEMATICS

Fundamental geometric concepts and construction of plane and solid figures, surface and volume measurements, and related problems; introduction to trigonometry of the right triangle. Introduces gear ratio, lead screw and indexing problems with emphasis on application to the machine shop. Practical applications and problems will furnish the trainee with experience over the wide range of geometric propositions and trigonometric relations in shop problems, concluded by an introduction to compound angle problems. Prerequisite: MATH 122.



## MA 124 ALGEBRA

The fundamental concepts and operations of basic algebra. The historical background and evolution of the number system is introduced and related to its present day use. Basic operations of addition, subtraction, multiplication, and division are covered in depth and related to the solution of various algebraic functions. The solution of first order equations, use of letters and signs, grouping, factoring, exponents, and the setting up of ratios, proportions and variations. Those laws, axioms, and postulates, relative to basic algebra are stated and discussed in detail. This course embodies solutions of algebraic equations graphically as well as algebraically. It presents functions of sets of numbers by pictorial graphs showing the relationships of number sets. In the solutions of simultaneous equations methods of addition, subtraction, substitution, and comparison are applied. In exponents, definitions of base, power, and exponent are included.

## MA 125 ELECTRICAL MATHEMATICS

To acquaint the student with the fundamental concepts of algebra; basic operations of addition, subtraction, multiplication and division are covered; time is spent in the solution of first order equations, use of letters and signs, grouping, factoring, exponents, ratios, proportions. Solution of equations both algebraically and graphically; a study of logarithms and use of tables. An introduction to trigonometric functions and their application to right triangles; a study of vectors for use in alternating current.

## MA 301 TECHNICAL MATHEMATICS

The real number system is developed as extensions of natural numbers, integers, and rational numbers. Insight into the processes of arithmetic and algebra is provided. Additional topics include sets, equations, number bases, number lines, coordinate systems, trigonometry of right triangle, vectors, dimensional analysis, and the derivative.

## MA 302 TECHNICAL MATHEMATICS

Algebraic operations are applied to linear, quadratic, and polynomial functions and special equations of second degree. Complex numbers are introduced and the study of the derivative is continued. Selected applications involving rates of change, maxima and minima, approximation, areas, and volumes are considered.

## MA 303 TECHNICAL MATHEMATICS

Ideas of algebra are used in a study of trigonometric, logarithmic, and exponential functions. Selected applications of calculus reinforce this approach. Polar coordinates are introduced and their applications expanded. Complex numbers, vectors, coordinate systems and their applications constitute other areas of study.

## MA 304 TECHNICAL MATHEMATICS

Algebra and fundamental ideas of calculus are used in the study of plane and solid geometric figures. Topics include curve sketching, maxima and minima, plane areas, curve lengths, volumes of solids, and surface areas. Some applications of first order differential equations and series representations of selected important functions are presented.

## MECH 111 OXYACETYLENE WELDING

Basic welding procedures and practice. The trainee will gain experience in the gas welding of small parts and tools. This course will present gas welding as it may be used by the machinist in the repair of tools and equipment.

## WELD 112 WELDING

Demonstrations by the instructor and practice by students in the welding shop. Safe and correct methods of assembling and operating the welding outfit will be emphasized. Practice will be given for surface welding, bronze welding, silver brazing, and flame cutting methods applicable to mechanical repair work. Prerequisite: None.

## WELD 121 WELDING

The various processes used for joining materials by welding are discussed. Lecture, demonstrations, and practice cover the oxyacetylene and arc welding processes, filler metals used, gases, currents, weldability of metals. Instruction is given in the set-up and safe operation of oxyacetylene welding apparatus. Students prepare joints by both hand and machine cutting with the oxyacetylene torch. Prerequisite: None.

## WELD 122 WELDING

Continuation of WELD 121 with practice given in arc-welding using A.C. transformer and D.C. motor generator welding machines. A study is made of the correct welding heats, polarities and electrodes to use when welding various materials and alloys. Prerequisite: WELD 121.

## CHEM 301 GENERAL CHEMISTRY

This course involves a study of the physical and chemical properties of substances, chemical changes, elements, compounds, gases, chemical combinations, weights and measurements, theory of metals, acids, bases, salts, solvents, solutions, and emulsions. In addition, a study is made of carbohydrates, electro-chemistry, electrolytes and electrolysis in their application of chemistry to industry. Prerequisite: MA 301.

## PHY 104 APPLIED PHYSICS

Introductory course in physics and its applications. Covers systems of measurement, theory of matter, properties of solids, liquids, and gases. Prerequisite: None.

## PHY 105 APPLIED PHYSICS

Basic principles of electricity, types of electricity, and its production, transmission, and transformation. Such factors as the electron theory, electrical measurement, magnetism, electromagnetism, and the magnetic effects of electricity constitute major areas of study. Prerequisite: PHY 104.

## PHY 106 APPLIED PHYSICS III

Physical principles of force, energy, work, and power; equilibrium, and the laws of motion; the principles of machines, mechanical advantages, and transmission of power in practical applications. The use of vectors, and graphical presentations constitute a vital part of this course. Prerequisites: PHY 104, MA 121.

## PHY 301 PHYSICS

A fundamental course which covers several of the basic principles of physics. The divisions included are solids and their characteristics, liquids in motion, gas laws and their applications. Laboratory experiments and specialized problems dealing with these topics are also an integral part of this course.



## **PHY 302 PHYSICS: WORK, ENERGY, POWER**

The major areas covered in this course are work, energy, and power. Instruction includes such topics as statics, force, center of gravity, and dynamics. Units of measurement and their application are also a vital part of this course. A practical approach is used in teaching students the use of essential mathematical formulas.

## **PHY 303 PHYSICS**

This course covers the basic theories of electricity, types of electricity, methods of production, and transmission and transforming of electricity. Such factors as the electron theory, electricity by chemical action, electricity by friction, electricity by magnetism, induction voltage, amperage, resistance, horsepower, wattage, and transformers are major parts of the course.

## **PHY 304 PHYSICS: LIGHT, SOUND, POWER**

The major areas covered in this course are light, sound, and power. Instruction includes such topics as center of gravity, and dynamics. Units of measurement and their application are also a vital part of this course. A practical approach is used in teaching students the essential mathematical formulas.

## **PHY 305 HYDRAULICS AND PNEUMATICS**

The basic theory of hydraulic and pneumatic systems and their combinations in various circuits. Function and basic design of circuits and motors, controls, electrohydraulic servo elements, plumbing, filtration, accumulators, and reservoirs, constitute major areas of study.

## **PHY 306 APPLIED MECHANICS**

Advanced study based on the concepts and principles of statics and dynamics. Parallel concurrent and non-concurrent force systems are studied in both coplanar and non-coplanar situations. Also presented are the concepts of centroids and center of gravity, moments of inertia, and the fundamentals of kinetics.

## **MECH 112 WELDING**

Demonstration by the instructor and practice by student in the welding shop. Safe and correct methods of assembling and operating the welding outfit will be emphasized. Practice will be given for surface welding, bronze welding, silver brazing, and flame cutting methods applicable to mechanical repair work. Prerequisite: None.

## **MECH 301 MATERIALS, TOOLS, AND PROCESSES**

An overall view of the methods and procedures used to transform the raw material into a finished product. Characteristics of metals, woods, and plastics and how these characteristics affect the selection and use of materials and methods of production in the manufacture of an object. Unit production system, sand casting, forging and allied processes, welding, sheet metal working processes, and woodworking processes constitute areas of study.

## **MECH 304 METALLURGY**

Properties of metals and various methods of changing these properties, classifications of metals, powder metallurgy, and factors contributing to production and selection of metals for use are areas of study.

## **MECH 305 STRENGTH OF MATERIALS**

A study of the stresses and strains that occur in materials when subjected to tensile, compressive, and/or shearing forces. Stresses in thin-walled cylinders, riveted and welded joints, shear and bending moment diagrams, deflection, eccentrically applied loads, torsion, and factors of column design.



## MECH 306 MACHINE PROCESSES

An introductory course designed to acquaint the student with basic hand tools, safety procedures and machine processes of our modern industry. It will include a study of measuring instruments, characteristics of metals and cutting tools. The student will become familiar with the lathe family of machine tools by performing selected operations such as turning, facing, threading, drilling, boring, and reaming.

## MECH 307 MACHINE PROCESSES

A continuation of experience begun in MECH 306 with advanced operations on the lathe, drilling, boring and reaming machines. The student will become acquainted with the milling machine in theory and practice. A thorough study will be made of the types of milling machines, cutter, jig and fixture devices, and the accessories used in a modern industrial plant. Safety in the operational shop will be stressed at all times.

## MECH 309 MACHINE PROCESSES

A study dealing with the newer concepts of work handling and automatic machining processes. A large portion of the theory units will cover topics such as methods of chipless production and new techniques in metal forming. An analysis of high energy forming, ultrasonic machining, electrolytic metal removal, chemical milling, numerical controls, and simplified building block numerical control systems.

## MECH 310 PHYSICAL METALLURGY

This is an introductory course in metallurgy. It will present an analysis of the structure of metals and alloys, atomic structure, nuclear structure, and nuclear reactions. Topics undertaken for study will be solid (crystalline) structures, methods of designating crystal planes, the liquid and vapor phases, phase diagrams, and alloy systems.

## MECH 312 PRACTICAL AUTOMATION

A comprehensive study of automation as it is interpreted and practiced by American industry of today. The fundamentals of automation and the results of this automation on industrial productivity, labor supply and demand, equipment and processes are topics which will be undertaken. Students will be presented with problems encountered when installing an automated system.

## MECH 313 PRODUCTION PLANNING

A study of day-to-day plant direction is subdivided for analysis into forecasting, product planning and control, scheduling, dispatching, routing, and inventory control. Case histories are discussed in the classroom for clinical analysis and courses of corrective action are developed.

## MECH 314 TOOL ENGINEERING

An introduction to the problems of tool engineering with emphasis on such topics as planning the processes of production, development and design of the necessary tools, and finally the integration of available manufacturing facilities. A practical analysis and comparison of the use and cost of tools, jigs and fixtures, dies, molds, and gages as they are utilized in our modern day manufacturing and production methods.









